Railway Maintenance Engineer

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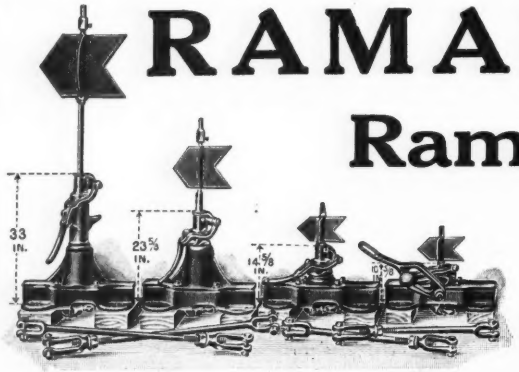

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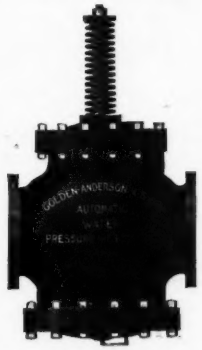

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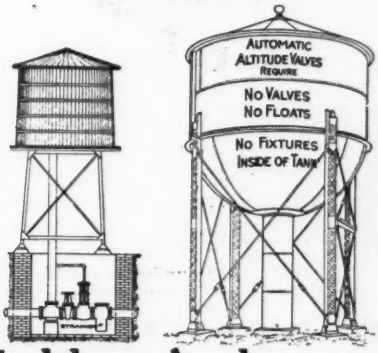

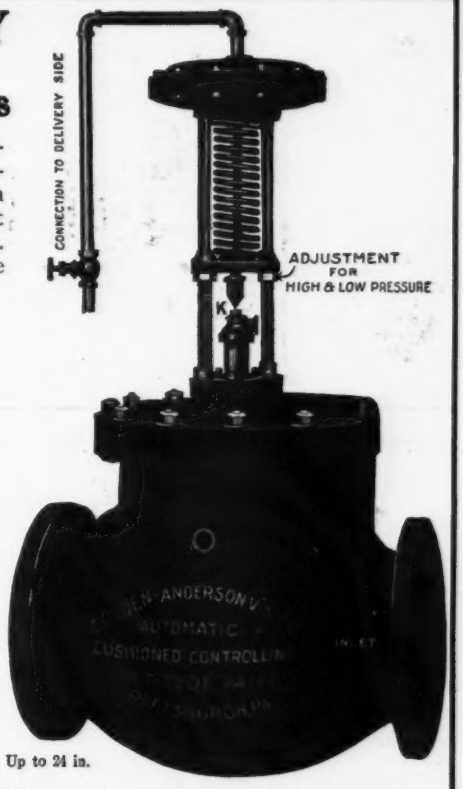

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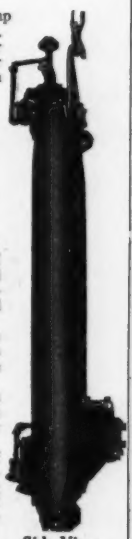

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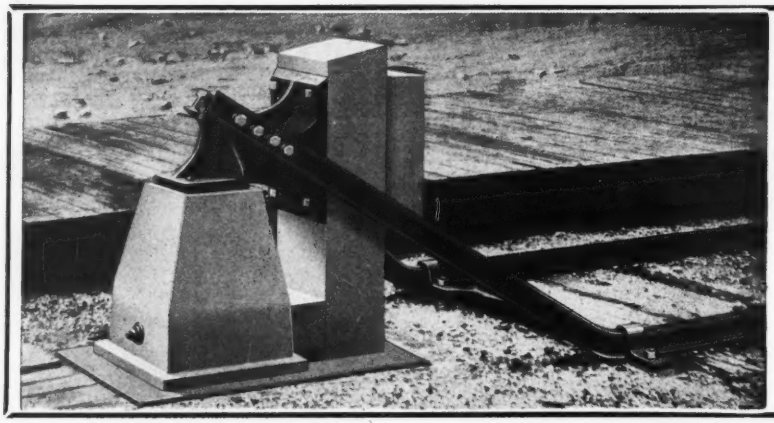

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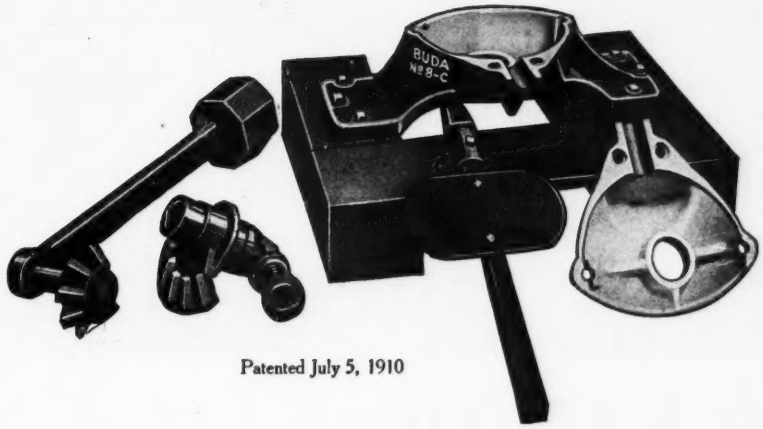

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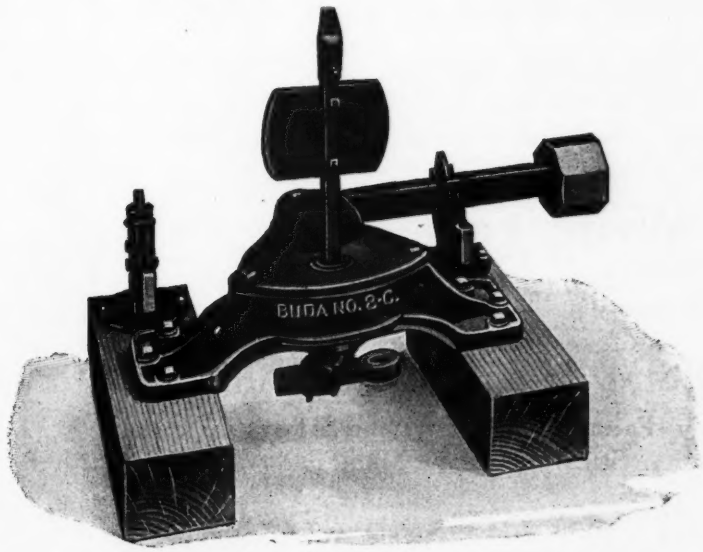

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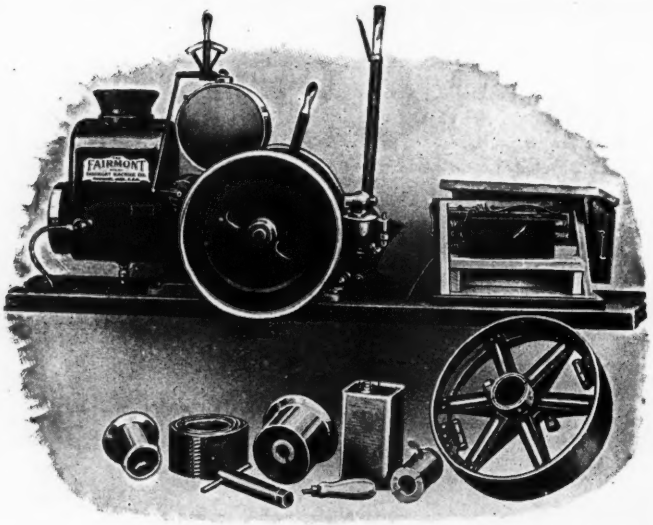

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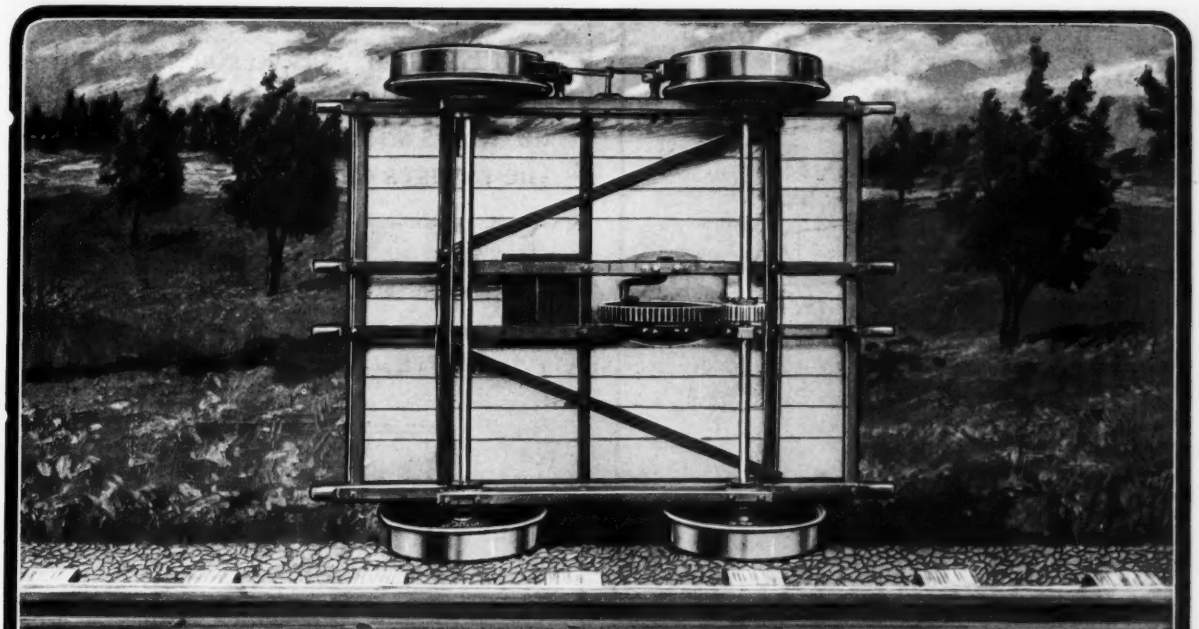

The Bottom of the Section Car Problem

Look at the bottom of this car.

There is no difference between it and other push cars.

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This car is equipped with Hyatt Roller Bearings.

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This means a saving of $21,000 to the average railroad operating one gasoline car every 10 miles of track.

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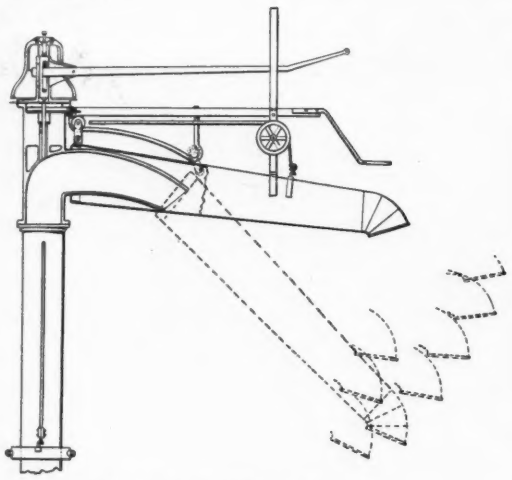
Tell the man who does your ordering to specify Hyatt Bearings for all new cars.

Send for Bulletin 1100, it contains valuable information.

Hyatt Roller Bearing Co., Newark, New Jersey



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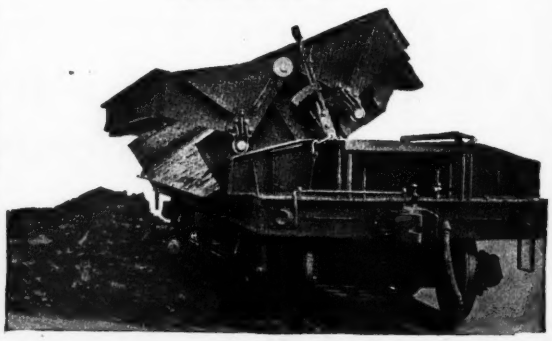

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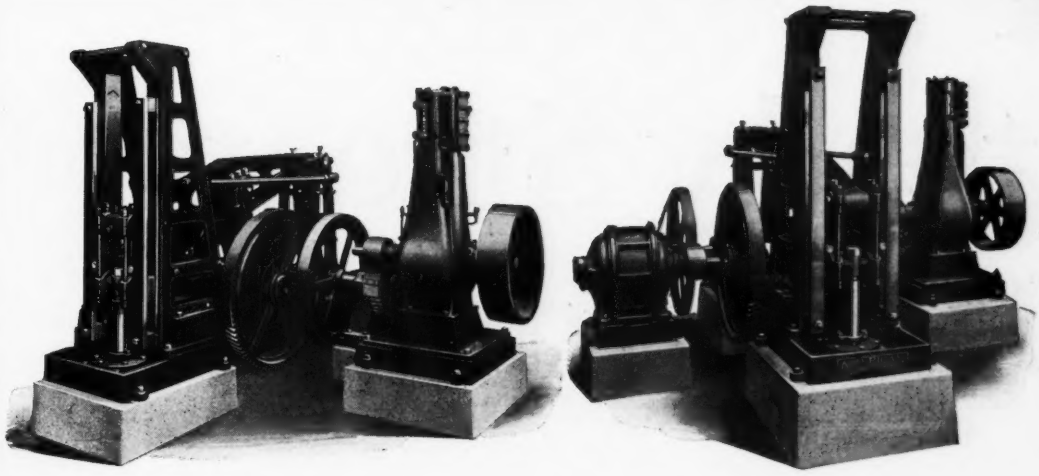

Power Insurance in Large Capacity Deep Well Water Supply

Many small municipalities and large industrial works obtain their water supply from deep drilled wells of comparatively small diameter which are most successfully pumped by deep well plunger pumps. The present usual power for such an installation is direct motor drive. To provide for emergency in case of injury or interruption of electrical power, many installations are now required to be equipped with two kinds of power.

For heavy duty pumping in this type of installation, The American Well Works has developed the above illustrated deep well power pumping head. This power head is shown gear driven by electric motor on one side and steam engine on the other, but an internal combustion engine or belt power may be substituted for the steam power.

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The pump plunger is operated by a powerful walking-beam oscillating on a fixed bearing at one end of the base.

Reciprocating motion is produced by a short, stout connecting-rod, which transmits power from the crank shaft, extending across the center of the frame, to the center of the walking-beam.

At the plunger end, connection is made with the walking-beam by short links provided with side bearing boxes operating in rigid guide frames.

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American Deep Well Plunger Pumps are described in Catalogue 130. Write for it.

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Railway Maintenance Engineer

Volume 12 December, 1916 Number 12

(With which is incorporated the Engineering and Maintenance of Way Edition of the *Railway Age Gazette* and *Railway Engineering and Maintenance of Way.*)

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WE GUARANTEE that of this issue 6,740 copies were printed; that of these 6,740 copies, 6,097 were mailed to regular paid subscribers, 93 were mailed to advertisers, exchanges and correspondents, and 550 were provided for new subscribers, copies lost in the mails and office use.

The *Railway Maintenance Engineer* has applied for membership in the Audit Bureau of Circulations.

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The Railroads and Rail Manufacture

For the second time within less than a year, the price of steel rails has been advanced $5 per ton, so that they are now quoted at $38 and $40 per ton for Bessemer and open hearth steels, respectively. To make matters worse, it is impossible to secure rails, even at these prices, for delivery within 6 or 8 months. Thus at one stroke the railways have received an added burden of $15,000,000 in operating expenses the second time within one year and must also take their turn in line, regardless of their needs. The position of the steel manufacturers bears a sharp contrast to that of the railways, who, confronted with a similar influx of business and subjected to a greatly increased cost of operation, not only cannot raise the price for which their product is sold, but are loudly criticized when they are unable to furnish cars for a few days or weeks at the most.

Cold Weather and Broken Rails

With the serious shortage of labor during the past season, much track work has necessarily remained undone. The high prices and delayed deliveries of rails have also resulted in a considerable amount of old rails being carried over in track until next year. As the past few years have been characterized by a large number of rail failures under even more favorable conditions, increased trouble from rail breakage may be expected this winter. It will require special vigilance on the part of all maintenance of way employees to insure that all such rails are detected and removed before they cause accidents. Supervisors can, therefore, well afford to discuss this matter fully with each of their foremen to impress the importance of attention to this work upon them and to instruct them regarding means of identifying dangerous rails. The foremen in turn should not only give this subject special attention themselves, but it is necessary that they in turn see that their track walkers and the men in their gangs co-operate in this work in order that traffic may be carried safely through the winter.

Reclaiming Bridge Materials

We have devoted a considerable amount of space in preceding issues to discussions of the reclamation of track materials. The reclamation of bridge and building materials is also of much importance, although the railways have been slow to realize the opportunities to effect savings here. The possibilities for the resawing of timber released from one use for further service in another place are surprisingly large if the subject is considered carefully. One road which sends all timber released to central points for reclamation finds that it can fill many of its requisitions from the material secured in this way, practically all of which would otherwise be burned or left on the ground. Likewise there is an opportunity frequently to use old steel bridge spans too light for use under present day trains, for highway spans or in building construction. One road recently built the supports for the runway for an overhead crane in a car shop from old bridge posts. Another used bridge trusses to support the roof of a large shop building. To develop the experiences of those who have reclaimed timber or steel bridge and building materials, we announce a contest on The Reclamation of Bridge and Building Materials. As far as possible con-

tributions should describe practices which have been developed and proposed modifications for other improvements. They should include as much detailed information regarding the methods followed, the amount and character of the material reclaimed and the savings effected as possible. If photographs are available they will also be of value. Prizes of $25 and $15 will be paid for the two best papers presented, based upon the practicability of their methods and their general application. Other papers accepted and published will be paid for at our regular space rates. All contributions should be sent to the editor of the *Railway Maintenance Engineer,* Transportation Building, Chicago, and must be received not later than January 10, 1917.

CONVENTION ENTERTAINMENT

THE problem regarding the proper amount and character of entertainment to provide at a convention and the relations which the supply associations should bear to the entertainment of the railway men have always been difficult to solve satisfactorily and permanently. While not so aggravated in the maintenance of way associations as in those in some other branches of railway service, these questions have nevertheless required attention from time to time. The impression prevails in some quarters that the primary purpose of a convention is to afford an opportunity for the members to relax and to enjoy the hospitality of the supply men and that the technical work of the association is made secondary. Largely for this reason some roads discourage attendance at conventions on the part of their employees. While this impression is by no means general, attention may well be called at this time to the marked improvement in the character of the entertainment provided at the maintenance of way conventions in recent years and to the relations existing between this and the more serious work of the associations.

From its organization the American Railway Engineering Association has always discouraged all forms of entertainment by supply men and the only relaxation from serious work during the three days' session is the banquet on Wednesday evening given by the association itself. While the National Railway Appliances Association presents its exhibit simultaneously with the convention, this is a thorough businesslike display of materials presented for demonstration solely on their merits and without any attempt at organized or unorganized entertainment or interference with the work of the engineering association.

The Roadmasters' Association has had the most serious problem to contend with. Previous to the organization of the Track Supply Association a few years ago entertainment was entirely unorganized with the abuses that such conditions always lead to. The Track Supply Association has taken this matter in hand and has worked closely in co-operation with the officers of the Roadmasters' Association until the convention is now on as high a plane as that of any other railway association. At the recent convention in New York the entertainment by the Supply Association was confined to the banquet on Thursday evening. On the two preceding evenings the convention held long night sessions for the discussion of committee reports in order to enable the members to make inspection trips over the terminals and tracks of roads in the vicinity of New York on two afternoons, which trips were provided by the railways and were a source of much instruction to the members of the association, many of whom had not previously had an opportunity to study track maintenance under such intensive traffic conditions.

The conventions of the Bridge and Building Association are conducted upon an equally high plane. At the New Orleans convention all of the entertainment, except a banquet, was provided by the members themselves or by the railways and consisted largely of visits to points of technical interest and instruction to the members.

With the conduct of these meetings upon as high a plane as now exists these associations deserve the hearty support of the railways, particularly in encouraging their men to affiliate with the respective associations, to attend the conventions and to participate in the collection and dissemination of information of value to the railways in promoting efficient maintenance of way practices. The frequent interchange of ideas on problems of general interest on the floor of a convention cannot help but broaden the viewpoint of those in attendance and serve to extend improved methods beyond the limits of the roads on which they originate.

A PLEA FOR STANDARDIZATION

IN contrasting American and German industrial methods, Dr. Chas. P. Steinmetz recently characterized the tendencies of this country as strongly individualistic, with each one preparing standards to suit his own peculiar conditions and fancies, while the Germans follow more general standards which, while not, perhaps, so well adapted to each individual installation, tend towards greatly decreased costs of production and resultant economy and promote industrial efficiency. While the railways are not worse offenders than other American industries, it must be admitted that there is much merit in this criticism as applied to them. In spite of the fact that the American Railway Engineering Association and other organizations have done excellent work in preparing standards for various materials, designed to harmonize different views and practices, these standards have not been generally adopted, the diversity continues to exist and in some ways it has shown a tendency toward greater extension. No one standard of rail section, for instance, is applicable to all conditions and a certain limited variety of standards is therefore advisable, or at least not seriously objectionable. No one will maintain, however, that the 12 or 15 different sections of 100-lb. rail in use to-day are necessary or advisable. When it is realized that this lack of uniformity extends through the joints, tie plates and almost all other details of construction, it is evident that the result is tremendously expensive in the aggregate.

A multiplicity of standards is objectionable for a number of reasons. In the first place, it increases the cost of production, for which the consumer must pay, through the necessity of making and keeping different rolls, patterns, etc. One manufacturer of special track work has over $100,000 tied up in a stock of different sections of rails alone. Not only must he carry the interest on this investment, but as a certain amount of the material becomes obsolete from time to time it must be sold at little better than scrap prices. Likewise this duplication of standards reduces the quantity of the output, again increasing the unit cost and at the same time delaying delivery. It is also not practicable for a shop to proceed with the manufacture of this class of materials during dull times in advance of orders because of this same condition. Another serious objection to a variety of standards is the increased amount of stock which each road must keep on hand to meet its requirements. When all of these losses are combined, the aggregate is enormous and the railways pay for all of it.

The principal reason for this condition is the unwillingness of the individual to subordinate his opinion to

that of the majority and to co-operate in the preparation of a common standard which will best serve the needs of all. Frequently the deviation is only in details which are of minor consequence, but they defeat the advantage of the standard, and it has not been uncommon for these departures to be actual detriments to the design as a whole. This is in decided contrast with the policy of one small railroad of adhering to the standards of the larger systems rather than to add to the already complicated maze of standards.

There never was a more propitious time than now to consider seriously the folly of our present lack of standardization, for not only is the necessity for economy in the purchase of materials great at the present high prices, but anything which will promote increased output and hasten deliveries is greatly to be desired. It is to be hoped that the present waste because of this condition can be eliminated. This can be done at once and will be done whenever those charged with the preparation of standards grasp the broader view of the problem and co-operate for the common good.

THE EFFECT OF HIGH PRICES

THE current high prices of labor and material and the shortage of both have brought about a more or less general policy of deferring the renewal or reconstruction of railway bridges and other structures in all cases where this can be done without encroaching on the limits of safety. This policy has resulted in many cases in placing an increased burden on the bridge maintenance forces who are compelled to exercise increased vigilance and ingenuity in making possible the continued use of structures which would have been replaced under normal conditions.

The influence of the present state of the labor and material market, particularly the latter, has also been noted in the occasional deviation from the usual types of construction. For example, concrete and timber structures are being built where steel would ordinarily have been used. Second-hand steel rails have been used as reinforcement in concrete arches when, under normal price conditions, it would have been more economical to use reinforcing bars which could then be secured within a reasonable time of delivery. For the same reason mass concrete structures have been used when conditions at normal times would point to the economy of reinforced concrete. Because of this, it is entirely possible that structures built or repaired at this time will be subject to adverse criticism at some time in the future when the conditions which led to the use of extraordinary designs or materials will be overlooked or forgotten. It is also more than likely that in the absence of records the cost of structures now being built will then be greatly underestimated.

A consideration of these facts points to the great opportunity for underestimates in the Federal valuation now in progress, in the absence of the direct testimony of those personally engaged in a given project or of records much more complete than those kept in the past, the unusual conditions or unforeseen contingencies are readily overlooked and the cost of the work as estimated will be based on average or normal conditions rather than those actually obtaining.

VESSELS BUILDING.—Builders' returns to the bureau of navigation, department of commerce, show that steel merchant vessels building or under contract to be built in private American ship yards on November 1 numbered 417, of 1,479,946 gross tons, an increase of 25,676 tons over the returns from October 1.

LETTERS TO THE EDITOR

TIE PLUGS

CONCORAN, CAL.

TO THE EDITOR:

In the early days of track maintenance tie plugs were rarely used except occasionally around frogs and switches as it was considered that they were hardly worth the trouble and time required to make them by hand. As new tie material has become scarcer and more expensive and treated ties have been more generally used, the use of the plugs has grown in favor, and machines have been invented to turn them out by the thousands.

Before the use of tie plates became general the plugs in their present form answered very well, and when applied, one blow of the sledge would drive them flush with the top of the tie, but with the introduction and general use of heavy shoulder tie plates the plug, in its present shape, has proved to be unsatisfactory. The shoulder, or head, left on the plug by the machine causes it to jam in the hole of the tie plate and it often requires the use of a track punch to properly seat the plug. The punch also frequently jams during the operation, causing more delay.

My idea of a tie plug for use under present conditions is one that will fit easily in the hole, can be placed by hand and will seat itself with the first tap of the maul on the spike that follows the plug. Also why should not a soft wood plug be used in a soft wood tie. I have seen old soft wood ties that, when released, had as many as six hardwood plugs strung in a line, where if soft wood plugs had been used they would have flattened from the pressure of the spike and would have held the spike more firmly.

G. REILLY,
Atchison, Topeka & Santa Fe.

THE COST OF WATER

TAMAQUA, PA.

TO THE EDITOR:

P. M. LaBach, in the September issue, page 278, demonstrates that it is impracticable to arrive at any true comparison of the efficiency of the water service department on the various railroads. Conceding this and recognizing the wide range of conditions it is difficult to see what benefit can be secured by attempting to establish unit costs for water service. Improved practices and proper supervision may be conducive to efficiency, but the present tendency is towards greater expenditures for water in order to supply a better quality of boiler water, to ensure an ample supply for all requirements and to deliver the water at such locations as will contribute to efficiency of operation as a whole. Any attempt to make a feature of the unit cost of such relatively insignificant items as water and oil may draw attention from such larger items as fuel, train crews, engine repairs, etc.

The writer recalls a recent instance where a desire to reduce the cost of water led to the abandonment of water treatment where the scale-forming material was close to the low limits recommended for treatment. A few months' trial showed a material increase in scale and a test of fuel conducted by the officer recommending the abandonment, showed such results as to bring urgent action for a return to treatment.

It may also be noted that the great supply of the Pennsylvania Railroad in the Pitsburgh district was not

installed to reduce the unit cost of water, but to facilitate the handling of freight, and there is no question that the benefits secured by this supply so greatly improved operating conditions along the old line that little has since been heard of the development of a new freight line north of Pittsburgh. An ample supply of water for railroads and manufacturers at Syracuse and Rochester, N. Y., are examples of increased efficiency secured by increasing the unit cost of water.

Let us give proper consideration to the smaller items of operating cost, but not at the expense of such major items as fuel consumption, train speed, tonnage or engine maintenance.

E. T. REISLER.

HOW SOME FOREMEN STUDY THEIR SECTIONS

ST. JOHNS, KAN.

TO THE EDITOR:

The most important detail in the maintenance of surface on rock-ballasted track is the preparation of the sub-grade to receive the ballast. The uniformity of width of fills is one of the most important considerations in the preparation of the roadbed, a minimum width of 20 ft. being advisable where from 8 to 12 in. of ballast is placed under the track. If a fill is irregular in width the track will be hard to maintain as it will settle more where the bank is narrow and if one side is wider than the other for any considerable distance it will be difficult to maintain the track to cross level. After one side becomes low the track will also go out of line from the increased thrust of the traffic on the low rail. Where curves are located on fills these same conditions will retard the maintenance of the proper uniform superelevation and line.

Where track regularly becomes low at certain times I have always made it a practice to investigate those places, endeavor to ascertain the cause and apply the remedy after bringing the track back to proper surface and line. On fills I have found that many of these low places result from a weak or narrow shoulder and I have been able to overcome this difficulty by strengthening the shoulder to the uniform width.

However, all rough track on fills is not attributable to the lack of uniform width, for a considerable percentage results from the character of the material composing the embankment. This can only be remedied by construction forces and after an embankment is built the only relief is to adopt measures to overcome the difficulty as far as possible. A roadbed is often seriously disturbed by small burrowing animals, particularly in sandy soil. They can be eliminated by the use of poison. Some fills contain water pockets which can be drained by driving a small pipe into the side of the embankment with the outer end low enough to drain the water out. If the pipe is plugged at the inner end when being driven into the bank and the plug is then forced out the water will escape readily.

Another cause of the settlement of banks is the presence of water along the side of a fill for considerable intervals. In most instances this can be removed by the installation of culverts, drainage pipes or ditches. While it takes some time for standing water to affect the surface of the track it usually leaks into the bottom of the embankment and gives trouble sooner or later.

As it is impossible to maintain good surface and line with loose bolts all the bolts should be kept tightened. In general they should be tested and tightened twice each year while the track forces should also tighten any found loose when working over the section during the season. When spotting up and lining track all bad ties should also be changed out as new ties can be inserted at much less cost at this time and they will aid materially in keeping the track in good surface and line.

V. H. SHORE,
Section Foreman, A. T. & S. F.

NEW BOOKS

The Preservation of Structural Timber (Second Edition). By Howard F. Weiss, Director United States Forest Products Laboratory, Madison, Wis. 352 pages, 90 illustrations, 6 in. by 9 in. Bound in cloth. Published by the McGraw-Hill Book Co., New York. Price $3.

From his position in charge of the Forest Products Laboratory at Madison, Wis., the author has an unequaled opportunity to accumulate accurate information regarding the latest developments in the field of timber and of its uses. The first edition of this book, which appeared two years ago, was received as a distinct edition to engineering literature, treating of a subject of which there was little authentic information in book form at that time. In this second edition the author has added a considerable amount of new data, particularly with reference to the durability of treated and untreated timber and has amplified that section relating to the art of rendering wood fire resistant. With the increased attention given to timber and its uses during the last two or three years this book should be of value to engineers interested in this form of construction.

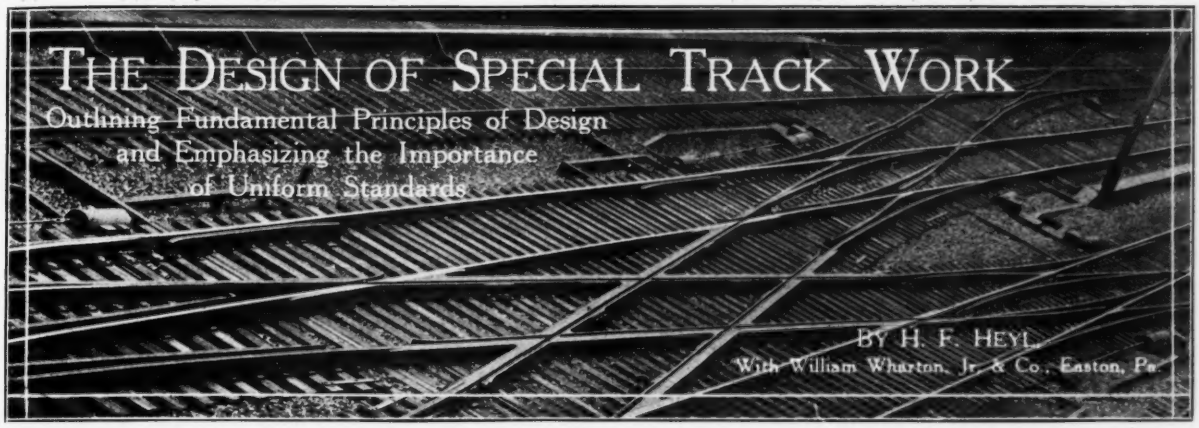
Handbook of Rock Excavation. By Halbert P. Gillette. 809 pages, 200 illustrations, 4¾ in. by 7 in. Bound in leather. Published by the Clark Book Co., New York. Price $5.00.

During recent years when the importance of the cost of handling work has been emphasized more than previously there has been an increased demand for cost data compiled under various conditions. Recognizing the value of such information the author of this book has performed a distinct service to engineers through his books and other writings on the cost of handling work. This handbook on Rock Excavation is a companion book to a similar volume on Earth Excavation which will be published soon and to a third book on Tunnels and Shafts, which is now in course of preparation. In the book on Rock Excavation the author gives a large amount of information concerning the tools and other equipment required for this class of work and the conditions under which they are of greatest advantage. Accompanying voluminous data on the cost of handling work are descriptions of different methods followed and the equipment used, enabling a student to analyze the figures and apply them to his local conditions. In some instances certain essential details are lacking, but the author stated that he thought it best not to exclude reliable records of actual cost merely because certain items were lacking, especially if those items could be supplied through the natural deduction of the experienced and competent reader.

Among the more important chapters in the book are those on Methods and Cost of Hand Drilling; Machine Drills and Their Use; the Cost of Machine Drilling; Cable Drills, Well Drills, Augers and Cost Data; Core Drills; Loading and Transporting Rock; Railroad Rock Excavation and Boulder Blasting; and Subaqueous Rock Excavation.

The book is prepared in the form of a handbook rather than a textbook with the expectation that it will find its greatest use by engineers and contractors in the field, although it will also be found useful as a text because of the valuable information which it contains.

IT PAYS.—One never can tell when a courtesy or a kindness will result in good both to the employee and to the road.—Santa Fe Magazine.



The Design of Special Track Work

Outlining Fundamental Principles of Design and Emphasizing the Importance of Uniform Standards

By H. F. Heyl
With William Wharton, Jr. & Co., Easton, Pa.

STEAM railroads are recognizing more and more the importance of a good grade of special track work, including under this term switches, frogs, guard rails, crossings (either rigid or with movable points), single and double slips, crossovers, turn-outs, curves and complex layouts and their parts. New installations and renewals of special work represent an expenditure for material alone, without the labor cost of installation, of from $12,000,000 to $15,000,000 annually. The subject therefore would appear to be an important one. The maintenance of special track work is also necessarily expensive, and the condition of these parts of the track structure largely affects the smooth riding of the trains and the life of the rolling stock.

The railroads and the manufacturers are continually bringing out new designs with the object of reducing the cost of maintenance and insuring a good track for the running of trains. Individual designers try to attain the object in different ways, the differences often being, however, in particulars relatively unimportant. The various and differing designs are multiplying so rapidly that there has been a growing necessity for the standardization of steam railroad work in such a way that the roads will adopt for their own the various standards recommended by different railway associations and by reputable special track work manufacturers.

THIS IS THE FIRST OF A SERIES OF ARTICLES ON THE DESIGN OF SPECIAL TRACK WORK. THESE ARTICLES WILL DISCUSS THE ESSENTIAL ELEMENTS IN THE DESIGN OF THESE COMPLICATED BUT NECESSARY DETAILS OF TRACK CONSTRUCTION. THEY WILL POINT OUT THE EXTENT AND CHARACTER OF THE INFORMATION WHICH A MANUFACTURER MUST RECEIVE FROM A RAILROAD BEFORE IT CAN UNDERTAKE CONSTRUCTION. THEY WILL ALSO COMPARE THE GOOD AND THE BAD FEATURES OF DIFFERENT DESIGNS AND POINT OUT THE RELATIVE POINTS OF MERIT AND THE DISADVANTAGES. SPECIAL EMPHASIS WILL BE LAID UPON THE PRESENT UNNECESSARY AND HIGHLY EXPENSIVE DUPLICATION OF STANDARDS, PARTICULARLY IN POINTS OF MINOR IMPORTANCE WHICH ADD TO THE COST OF PRODUCTION BY THE MANUFACTURER, AND FOR WHICH THE ROADS MUST AND DO PAY. THE MAGNITUDE OF THE AMOUNTS EXPENDED BECAUSE OF THESE VARIATIONS IN STANDARDS IS NOT GENERALLY REALIZED.

THE AUTHOR OF THESE ARTICLES HAS BEEN DIRECTLY ENGAGED IN THE DESIGN AND MANUFACTURE OF SPECIAL TRACK WORK FOR THE PAST 10 YEARS, FIRST AS A DRAFTSMAN IN A DESIGNING OFFICE, THEN AS AN ENGINEER IN THE SHOPS AND IN THE FIELD, AND MORE RECENTLY AS CHIEF ESTIMATOR WITH ONE OF THE LARGE MANUFACTURERS OF THIS CLASS OF MATERIALS. IN HIS PRESENT POSITION HE NOT ONLY SEES ALL NEW DESIGNS OF THIS MANUFACTURER, BUT ALL PLANS SUBMITTED TO THIS COMPANY BY THE RAILROADS PASS THROUGH HIS HANDS, GIVING HIM AN UNUSUAL OPPORTUNITY TO STUDY A WIDE VARIETY OF STANDARDS AT FIRST HAND AND TO OBSERVE THEIR POINTS OF MERIT AND THEIR DISADVANTAGES.

The Variety of Standards

A committee of the American Railway Engineering Association has been working for years to standardize track work and the larger special track work manufacturers have also spent considerable time, labor and money in standardizing manganese track work, their findings having been endorsed by the American Railway Engineering Association. Yet relatively few roads have adopted these recommendations.

It seems that every time a railway issues a new set of standard plans new details appear which cause extra expense. It often happens that designs requiring special patterns, special forgings or different methods of planing are incorporated on drawings, and the question naturally arises as to the advisability of the various associations and committees making special studies of these problems whem the railroads are not recognizing their value and the advantages to be gained from their use.

Taking steel sockets as an example, special track work manufacturers have dies for certain sockets. A railroad prepares its own detailed drawings on which all dimensions are given. If any one of the dimensions differs from the manufacturers' standards, the existing dies for forging the sockets cannot be used, with the resultant increase in the cost of manufacture of the socket. Special sizes of materials, as, for example, special bolts, bolt heads or nuts, special threads or any other unusual requirements as to sizes are the cause of much trouble and expense. This is especially true at the present time when materials are difficult to get under any circumstances, and it is almost impossible to secure materials of special sizes.

The subject of rail sections has been an absorbing one for the engineer, the rail mills and special track work

manufacturers ever since the tee rail came into general use. Here again various associations, including the American Society of Civil Engineers and the American Railway Association, have been at work designing sections from which it would seem that a section suitable for any special conditions could be selected. Nevertheless, there are now in active use nearly a dozen different sections of 100-lb. rail (Fig. 1) and to these should be added several more sections weighing practically 100 lb. per yd., in which a little metal has been added to the head or to the base of the regular 100-lb. rail section. Figure 2 shows three popular sections in which the exceedingly small differences are apparent and yet one section cannot be substituted for the other in the manufacture of frogs and switches.

In the manufacture of special track work this great variety of rail sections creates the constant necessity of keeping on hand a stock of all these different rails amounting to many tons and involving a large investment, with the added danger of some of this stock becoming obsolete or otherwise unfit for use before it is worked up and so reducing its value to scrap. It further means, also, almost countless different patterns and different fittings of all kinds to suit each rail section and design for frogs, switches and crossings, which must be kept on hand or be specially manufactured. This means expense that somebody has to pay for and often means delay in turning out the special track work needed by the railroads.

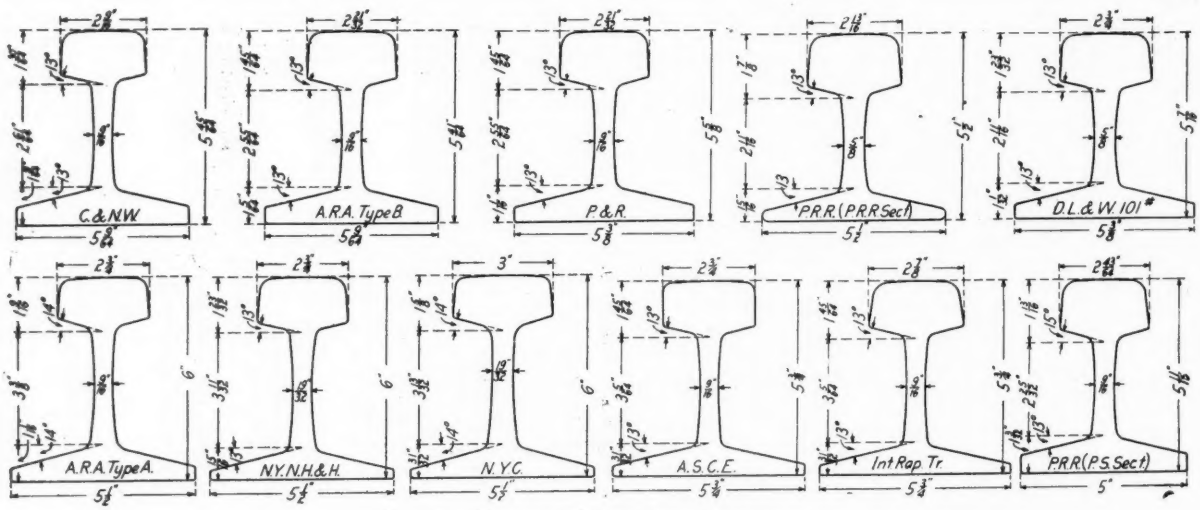


FIG. 1.—ELEVEN 100-LB. RAIL SECTIONS

IMPORTANCE OF UNIFORM STANDARDS

Any railroad should follow some standard. The switches or frogs which it uses should be alike and interchangeable as far as possible. The road should know when it sends out inquiries on certain material, exactly what it desires the special track work manufacturer to figure on and not leave the designs to him, for it frequently happens that a manufacturer may make a price on a considerably less substantial switch than was intended. Again a railroad may order from one special track work manufacturer at one time, and from another at another time, and unless the company follows a certain standard, it may get entirely different articles. For instance, one company may furnish 5-in. slide plates and another 6-in. slide plates, one pressed steel braces and another malleable iron braces, etc. The material should be kept as nearly alike as possible, and should preferably follow the existing best practices.

In manganese steel work the Manganese Track Society has embodied in its standards for frogs the experience of years in the manufacture of these materials and of the manganese steel castings themselves to get the best results. The railroads can do no better than to profit by this experience, and the adoption of these standards will in hardly any case interfere with existing general standards, such as the length of the frogs. Detailed plans for such frogs, gotten out by some railroads often differ only in minor details, the dimensions frequently only differ by a few inches, but they necessitate new sets of patterns. Engineers not entirely familiar with the foundry practice necessary in the making and treating of manganese steel castings are further apt to proportion the castings called for by the design in such a way that the best results both as to service and safety cannot be obtained.

The same principles apply to manganese steel crossings. The Manganese Track Society has gone into the details of various styles of crossings thoroughly, and it has recommended certain types for certain angle limits. It is a simple matter for a railroad when ordering crossings to give the angle of the crossing and the degree of curve, and to specify "to be according to Manganese Track Society Standards." The company will then know exactly what it can expect, and the manufacturer will know exactly what the railroad company wants.

The determination as to when to use manganese steel is largely a matter of opinion, and depends a great deal on conditions. On track where there is severe traffic it is unquestionably the cheapest construction in the long run and quite a few of the larger roads use manganese steel frogs on main line traffic altogether. From the point of view of a trackman it is much the best construction, both in regard to ultimate service and economy in maintenance.

Perhaps the greatest number of delays in filling orders for special track work is caused by unnecessary correspondence, owing to the fact that the manufacturer is not given enough information when the order is first received to enable him to proceed with the construction. It happens all too frequently that the order does not state the rail section, the rail drilling or even the style of construction for the work required. In subse-

quent articles the information required by a special track work manufacturer to build a switch, a frog, or a crossing will be given. Curves in special pieces should be eliminated as far as possible. First of all, the pieces having curves are not interchangeable with standard pieces, and secondly, they cost considerably more than straight pieces.

INSPECTION

All of the large special track work manufacturers have their own corps of inspectors who inspect every piece before it leaves the shop. Every slip switch is set up in order to check the dimensions and the fit of the various parts. All rigid, movable, single and double slip crossings are similarly assembled complete before shipment. In addition to this, many roads send their own inspectors to see that the work is strictly in accordance with the designs of the railroad, and that the material is up to specification. There are differences of opinion among railroad inspectors as to the deviations allowable from drawings and specifications in given dimensions, accuracy of workmanship, etc. The character, class and nature of the pieces also have a bearing upon the degree of accuracy to be expected or the variations allowable, and it would be difficult to set fixed rules to cover all cases. The matter must be left largely to the judgment of the inspector.

The question of gage is a very important one, and almost every engineer has his own views in regard to it. The American Railway Engineering Association has recommended that 8 deg. curves and under should be maintained to standard gage, and that the gage should be widened ⅛ in. for each 2 deg. or fraction thereof over 8 deg. to a maximum of 4 ft. 9¼ in. Where frogs occur on the inside of curves the gage at the frog should be standard or the flangeway should be widened to compensate for the increased gage. The clear width of standard flangeway for all frogs, and between main rails and guard rails, should be 1¾ in. measured at the gage line, for all tracks of 4 ft. 8½ in. gage.

There are many appliances for the maintaining of gage. Their use depends entirely on conditions. Within proper limits a slight variation from standard gage is not seriously objectionable, provided the variation is uniform and constant over long distances. Wide gage due to worn rail need not be corrected until the excess over the proper gage is equal to ½ in. Railroads which follow a different practice from the above as to gage of their work should have a clear understanding with the special track work manufacturer from whom they order.

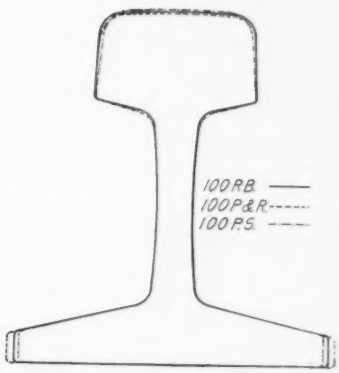


FIG. 2.—THREE 100-LB. RAILS

A good foundation is one of the most important items in connection with good track work, for the best track construction will not give good results on a poor foundation. A good foundation eliminates many items of maintenance. This is especially true of crossings. A roadbed which, for instance, is not properly drained, gradually allows the crossings to sag and creep badly. The result is that the bolts become loose and some part breaks. This not only causes unnecessary maintenance cost, but frequently requires the premature renewal of the structure.

The Improvement of an Old Line*

BY B. B. SHAW,
Division Engineer, Chicago, Rock Island & Pacific, Little Rock, Ark.

THE Choctaw, Oklahoma & Gulf was built across western Arkansas and eastern Oklahoma in 1899, and was acquired by the Rock Island in 1903. Previous to 13 years ago that portion of the country through which the line passes was practically undeveloped, but following the opening of the Indian lands in Oklahoma in 1903, the settlement of this country has proceeded rapidly. As a result, in 1914, an average of four passenger and 10.3 freight trains passed over the section of track under consideration daily and the freight traffic density for this year was 3,211,951 gross tons per mile of line.

Until recently consolidation locomotives were employed in freight service with a total weight of 161,870 lb. This type of engine has recently been replaced by one weighing 206,000 lb., and when the work of strengthening the bridges for Cooper's E-55 loading is completed, Mikado locomotives with a total weight of 320,000 lb. will be used. The largest freight equipment now employed consists of 50-ton cars weighing with overload a total of 77 tons. The operation of this equipment has made necessary the replacement of the old 65-lb. rails with new 90-lb. rails. For the adequate protection of the heavier rail, additional ballast was required, which in turn made necessary the widening of the existing embankments.

The roadbed was built originally with a 16-ft. crown on embankments with 1½ to 1 side slopes, and a 12-ft. crown in cuts with 1 to 1 side slopes, and a 4-ft. ditch on each side. Owing to weathering, the embankments have sloughed off to a width of approximately 14 ft. In improving the line the standard roadway section was increased to 20 ft. with 1½ to 1 slopes on embankments and 5-ft. ditches on each side in cuts, and 8 in. of ballast was placed under the ties.

The contract for bank widening was let to one contractor, who in turn sublet the work to ten sub-contractors. Owing to the small yardage, ten-team outfits secured the best results. To create a spirit of competition such an outfit was placed on each mile, with the stronger and weaker outfits alternating. All work was completed out of face. The soil handled was classified as 81.04 per cent earth, 10.97 per cent loose rock and 7.99 per cent solid rock. The loose and solid rock consisted of bituminous shale, argillaceous sandstone and limestone. While it was necessary to blast the shale and sandstone, they disintegrated on exposure to the elements. The limestone was also blasted, but care was taken not to shatter it, and it was piled for convenient loading for use later as riprap.

The following table shows the average cost per mile of bank widening:

Earth, 2,134 cu. yd., at $0.23	$ 502.32
Loose rock, 296 cu. yd., at $0.40	118.40
Solid rock, 215 cu. yd., at $0.80	172.00

*Abstracted from a thesis presented at the University of Illinois, June, 1916.

Clearing, 0.4 miles, at $12.00	4.80
Force account, actual cost plus 10 per cent, cleaning out water pockets	169.28
Force account, actual cost plus 10 per cent, moving rails	7.34
Engineering, actual cost of bank widening one mile	35.21
	$1,009.35

(The average cost of all material moved was 29.4 cents per cu. yd., and the cost of engineering 3.62 per cent of the labor charges.)

The first item of force account was for cleaning out pockets of gumbo soil. The second item covers the cost of moving rails which had been distributed for relaying.

Overhaul was not allowed, and excavation that could not be used for widening embankments within the 500-ft. free haul limits, was wasted on false berms, along surface ditches or below sub-grade along embankments. A total of 79.8 per cent of the cost of this work was chargeable to Additions and Betterments.

The original 65-lb. A. S. C. E. rail was replaced by 90-lb. open hearth A. R. A. Type A rail, 33 ft. long. The rail laying was done with company forces, the gang consisting of a foreman, timekeeper and 40 to 70 laborers. The organization varied from day to day, according to the work.

From the following tables showing the cost of relaying with 90-lb. rail, the value of the material recovered, and the estimated cost of relaying with 65 and 67-lb. rail, the cost of Additions and Betterments for one mile is derived:

NEW 90-LB. MATERIAL

Labor	$ 569.02
Work train	89.32
Tools and supplies	16.28
90-lb. rail, 10,716 ft., at .41067	4,400.74
90-lb. angle bars, 3 pr., at 1.08	3.25
90-lb. continuous joints, 325 pr., at 1.56839	509.73
Track bolts, 2,264 lb., at 2.20 cwt.	49.81
Nut locks, 1,311 pcs., at 5.20 M	6.82
Spikes, 3,097 lb., at 1.80 cwt.	55.75
Tie plugs, 9,932 pcs., at .76415 M	7.59
Tie plates, 6,369 pcs., at .10393	661.93
No. 10 spring rail frogs, 90-lb., 0.9 pcs., at 58.54	52.69
Complete switches, 0.9 pcs., at 49.56	44.60
Complete guard rails, 1.8 prs., at 15.17	27.31
Turnout plates, 0.9 sets, at 3.39	3.05
90 to 65-lb. off-set joints, 1.6 prs., at 2.40	3.84
90 to 85-lb. off-set joints, 0.18 prs., at 3.04	.55
90 to 80-lb. off-set joints, 0.05 prs., at 3.04	.15
Rail anchors, 400 pr., at .16	64.00
Engineering	7.23
Total cost material and labor (one mile)	$6,573.66

MATERIAL RECOVERED

65-lb. rail, 10,598 ft., at .213	$2,257.37
67-lb. rail, 118 ft., at .219	25.84
65-lb. angle bars, 354 prs., at .30	106.20
67-lb. angle bars, 4 prs., at .30	1.20
65-lb. tie plates, 61 pcs., at .05	3.05
No. 10 spring rail frog, 65-lb., 0.9 pcs., at 20.25	18.23
Complete switches, 0.9 pcs., at 17.15	15.44
Complete guard rails, 1.8 pcs., at 4.90	8.82
Scrap bolts and spikes, 1.99 tons, at 12.00	23.88
Total value of material recovered (one mile)	$2,460.03
Total cost of material and labor (one mile)	8,573.36
Net cost of relaying	4,113.63

(Cost of engineering, 0.18 per cent of labor and material charges.)

ESTIMATED COST TO RELAY WITH 65- AND 67-LB. RAIL

65-lb. rail, 10,598 ft., at .29659	$3,143.26
67-lb. rail, 118 ft., at .30572	36.07
65-lb. angle bars, 354 pr., at .56	198.24
67-lb. angle bars, 4 pr., at .59	2.36
Track bolts, 1,013 lbs., at 2.20 cwt.	32.29
Nut locks, 1,311 pcs., at 4.80 M	6.29
Spikes, 3,097 lb., at 1.80 cwt.	55.75
Tie plugs, 9,932 pcs., at .78415 M	7.59
Tie plates, 61 pcs., at .087	5.31
No. 10 spring rail frogs, 65-lb., 0.9 pcs., at 45.65	41.09
Complete switches, 0.9 pcs., at 41.36	37.32
Complete guard rails, 1.8 pcs., at 8.34	15.01
85 to 65-lb. off-set joints, 0.18 pcs., at 3.28	.59
80 to 65-lb. off-set joints, 0.05 pcs., at 3.05	.15
	$3,571.32
Add 10 per cent for superintendence, contingencies, etc.	357.12
Total cost to relay with 65- and 67-lb. rail (one mile)	$3,928.34

From the table covering the cost of the 90-lb. material, the items of labor, work train, tools and supplies and engineering amounting to $681.85, being straight operation, were deducted, leaving an Addition and Betterment charge of $1,963.47, an operating charge of $2,150.16 and a stock charge of $2,460.03.

The track was originally ballasted with cinders, burnt gumbo, hand-broken stone and earth. Blue trap diabase rock, machine-crushed, and screened over a ¼-in. mesh and through a 2½-in. mesh, as specified, was the new ballast. The ballasting was performed by company forces, consisting of a foreman, timekeeper, 3 flagmen, 1 waterboy, 12 raisers, 7 men gaging, lining and surfacing, 12 tampers and 6 floaters.

The table of labor and material for ballasting reduced to a one-mile unit is as follows:

Ballast used, 2,518 cu. yds., at 70c	$1,762.60
Ballast inspector	40.10
Work train	111.55
Unloading	68.76
Applying	784.19
Raising bridges and cattle guards	25.67
Skeletonizing	115.95
Engineering	32.75
Cost of ballasting (one mile)	$2,941.57

(Cost of ballasting per cu. yd., $1.1682; cost of engineering, 1.13 per cent of the labor and material charges.)

The items "raising bridges and cattle guards" and "skeletonizing," plus the cost of replacing the original ballast, give the operation charges, which, reduced to a percentage basis, are 15.024 per cent of the total, leaving the Addition and Betterment percentage as 84.976. These percentages, applied to the preceding table, give the operating charges of $562.29 and the cost of Additions and Betterments as $2,379.28 per mile.

The total cost of improving one mile of line was:

	Total Cost	Additions and Betterments
Bank widening	$1,009.35	$ 664.50
Rail laying	4,113.63	1,983.47
Ballasting	2,941.57	3,379.28
	$8,064.55	$5,007.25
Charge to operation		$3,057.30

(Total cost of engineering, 0.94 per cent of total labor and material charges.)

Previous to the improvement, the yearly maintenance of one mile of track was approximately $800, not including bridge and building charges. The Addition and Betterment charge of $5,007.25, capitalized at 6 per cent, costs $300.44 per year. The yearly saving made by the reduction of sections and labor alike is $306. Before the improvement, the track was divided into five and six-mile sections, with a foreman and four to six laborers on each; now a section covers seven miles, one section having been eliminated, and the labor is reduced to a foreman and three men. When the work is completed as authorized, another section will be eliminated.

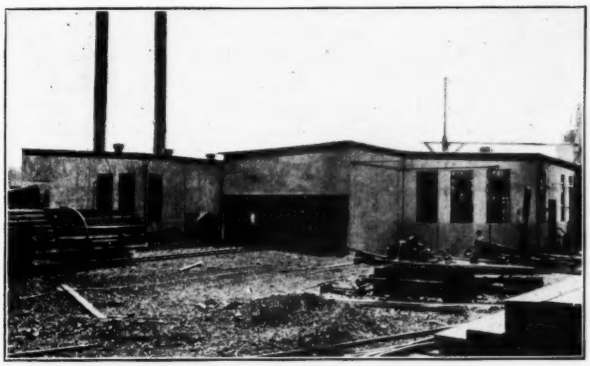
Before the improvement the cost of tie renewals was 40 per cent of the total maintenance; now with the better drainage conditions and the reduction of mechanical wear, the life of the ties is lengthened.

L. & N. Timber Treating Plant

This Layout Has Been Entirely Rebuilt Because of a Disastrous Fire. A Number of Interesting Features

THE Louisville & Nashville has recently completed the rebuilding of its creosoting plant at Gautier, Miss., which was burned on August 13, 1915. This plant was one of the first built in this country and is the oldest in the United States in point of continuous operation.

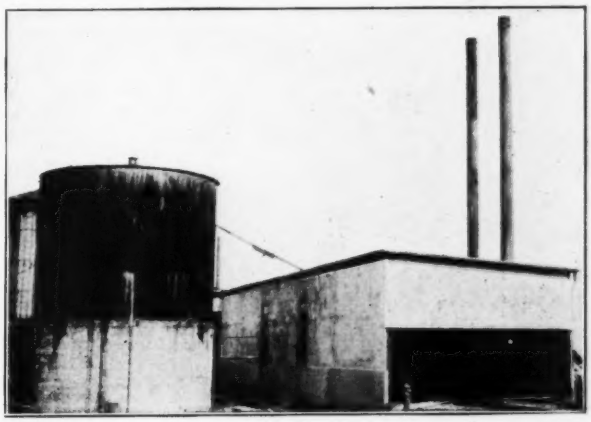
The main line of the Louisville & Nashville from Mobile to New Orleans includes several long trestles across indentations of the Gulf of Mexico, the timbers in some of which are subjected to severe attack of marine borers. These borers soon showed the necessity for the treatment of all piling and an open tank plant was at once installed. In 1876, this open tank plant was changed over into a one cylinder pressure plant. On May 1, 1880, the Louisville & Nashville R. R. acquired active control of the New Orleans & Mobile, as the line west of Mobile was known. Two cylinders were added to this plant by the L. & N. at different dates previous to 1902, when all three cylinders and the remainder of the layout were destroyed by fire.



Cylinder House and Boiler Room

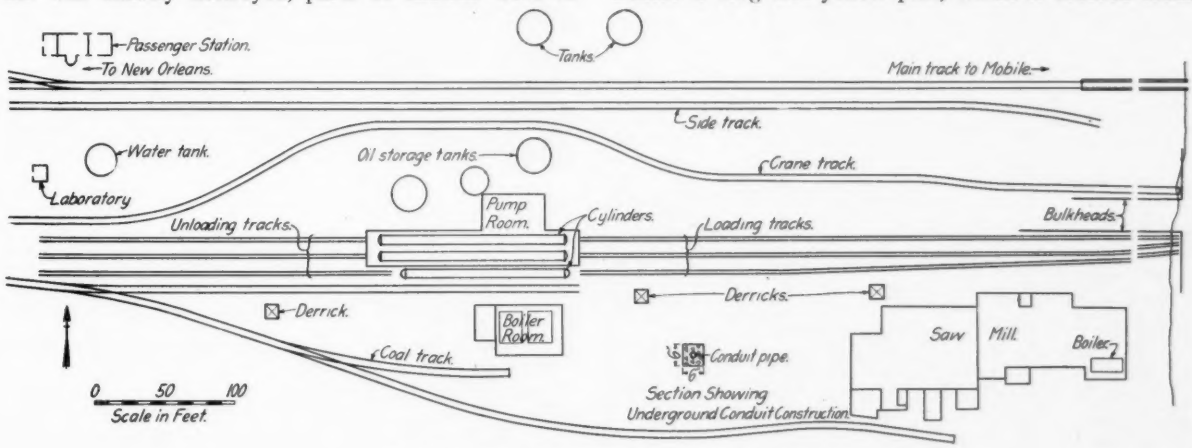
The plant was at once rebuilt with the buildings of timber construction covered with galvanized iron, housing three cylinders, each 6 ft. in diameter and 115 ft. long. It was this plant which was destroyed by a second fire last year, caused by an explosion of gas which had collected in the top of the cylinder room. In this later fire one cylinder was entirely destroyed, parts of another were reclaimed, while a third was in such condition that it could be used with only slight repairs. This cylinder was turned end for end, moved on new foundations and placed in service with a delay of only one week.

The Gautier plant treats bridge timbers and piling exclusively, employing the full cell treatment and supplying the bridge material for the entire system. The Louisville & Nashville operates a second timber treating plant at Guthrie, Ky., at which only ties are treated, which are used on the lines north of Birmingham, Ala., untreated cypress ties being used south of that point. In addition to the large amount of timber bridging on the Gulf division, ballasted deck construction is now standard for trestles on all parts of the system except this division, where open deck construction is used. Only creosoted timber is used in wooden bridges. About 10,000 piles and about 6,000,000 ft. B. M. of timber are treated annually at Gautier. Because of the depth of water encountered at a number of the bridges on the Gulf division a large amount of the piling treated is of long dimensions. All of the dimension timber except the bracing is framed before treatment.



Cylinder House and Oil Storage Tanks

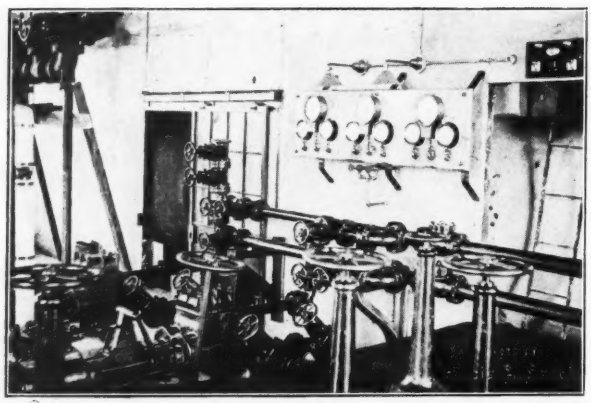
With the exception of the bracing all of the material treated is long leaf yellow pine, which is secured from



Plan of the Plant and Track Layout

points south of Montgomery, Ala. The Gautier plant is located on the shore of an inlet of the Gulf into which three streams enter at the upper end. This makes it possible to deliver 65 per cent of the piling to the plant by water. About 25 per cent of the timber also comes to the plant by water in the form of logs and is sawed to the required dimensions at this point. The remainder of the piling and dimension timber is received by rail.

All timber is treated green as it comes from the water, although, as much of it has been in the water for periods



INTERIOR OF THE OPERATING ROOM

ranging from 6 weeks to 3 months, it is fairly well seasoned in this way. Good penetration is secured in the treatment although a longer time is required, from 21 to 30 hours being necessary to treat this timber, depending upon the condition of the material.

As far as practicable the material recovered from the old plant was used in the reconstruction. This accounts for the difference in the size of the two working tanks and the use of three small oil storage tanks instead of one larger one. The boilers and a considerable portion of the original power plant have also been used in the revised layout. The use of this older material has also influenced the arrangement of the plant since it was necessary to locate the new buildings and other facilities to fit the location of that part of the equipment of the old plant which was utilized. Thus the arrangement of the present plant is entirely different from that which would probably have been provided had the designers been free to adopt the most desirable arrangements.

In so far as the plant has been designed new, it is similar in general details to that built at Guthrie, Ky., in 1913. In both of these plants particular attention was paid to the detailed design of pipe fittings and connections in order to reduce fuel consumption and to prevent the leakage of water into the oil. Before completing the plans for each of these plants a visit was made to most of the larger and more modern installations in this country in order to secure the best ideas of each.

It was necessary to construct all the new buildings and install the equipment without interfering with the operation of the cylinder recovered intact from the fire. The new buildings are of fireproof construction, with steel frames and 6 in. concrete curtain walls 8 ft. high with 2½ in. stucco on metal lath above. Concrete floors are used throughout.

The retort house is 153 ft. long and 24 ft. wide. It opens directly into an engine room 45 ft. long and 25 ft. wide in which are located the pumps and operating equipment. In that retort room are two cylinders, one of which is 7 ft. in diameter and 133 ft. long and the other is 6 ft. in diameter and the same length. The larger cylinder is new throughout. The larger diameter was determined on as a desirable size for tie plant operation. If the amount of bridge timber to be treated decreases in the near future it is proposed to transfer this larger cylinder to a new tie plant, the construction of which is now under consideration. The 6 ft. cylinder is composed in part of material recovered from the old plant, 68 ft. of the shell being cut from a cylinder which was installed in this plant four years ago and was still in serviceable condition after the fire. A third cylinder which was recovered from the fire and quickly placed in operation is located outside the retort house, where it will be operated for 3 or 4 years, or as long as it is serviceable.

Two 50,000 gal. measuring tanks were uninjured by the fire and were returned to service without alterations. The oil in these tanks is heated by live steam which passes through six ½ in. pipes enclosed in 2 in. pipes, the steam entering the coils through the smaller pipes and returning with the condensation to the feed water heater through the larger one. In this way it is possible to raise the oil to a high temperature in two hours. The oil passes from these tanks to the cylinders by gravity through a 10 in. pipe line and it is pumped back through the same line. The pressure pump operates through a 4 in. pipe line. Gage boards in the operating room indicate the amount of oil in the measuring tanks at any time.

In emptying the cylinders, the oil can either be pumped back directly into the measuring tanks or drained into an underground tank from which it can be pumped into the storage tanks by means of a 12 in. by 12 in. by 12 in. Worthington pump, set in a depressed pit in the engine room. In filling the cylinders, an electric contact rings a bell and turns on a light when the oil touches the top of the cylinder. The oil pressure pumps are equipped with regulating valves to maintain the pressure at 125 lb. In a similar way the steam header is equipped with a regulating valve to limit the steam pressure in the oil storage tanks or in the cylinders to 45 lb., preventing too high pressure in the heating pipes.

The vacuum is secured and maintained by means of

THE YARD AND DERRICKS

two vacuum pumps recovered from the fire. The vacuum is drawn from the top, enabling all water accumulating during the steaming process to be drained out to a sap drum under the cylinder.

All valves are located under a false steel floor at one side of the engine room, adjacent to the cylinders. The valves are arranged to enable oil to be pumped to any tank or cylinder in the plant. The high pressure valves are equipped with by-passes to permit the pressure to be released before these valves are opened. A complete

drainage system has been built underground, carrying the water to an outlet at one end and the oil escaping from the ends of the cylinders to an underground storage tank at the other end.

All 10-in. oil pipes under floors are laid in 24-in. by 24-in. concrete tunnels to enable them to be withdrawn readily for alterations or repairs. As a protection against fires a 50,000-gal. water tank on a 50-ft. tower is provided, also a 12-in. by 8½-in. by 10-in. Laidlaw-Dunn-Gordon fire pump, both connected to 6-in. and 4-in. underground pipe lines about the yard. Electric lights are used throughout the plant and yard, power being provided from a small generator in the engine room.

A boiler house and a small shop are located in a separate building a short distance from the cylinder house. Two sets of boilers which were recovered from the old plant burn either wood or coal and are equipped with a Cookson feed water heater. Coal is delivered into a pit at the door of the boiler house from a track extending along side. The machine shop is equipped with an air compressor, a 14 in. lathe and a few other tools sufficient to handle the ordinary repair work around the plant.

One of the interesting features of this installation is a saw mill located at the water's edge. This mill was installed primarily to frame all bridge timber except braces, before treatment, but its activities have been extended to include the sawing direct from the logs of about 25 per cent of the dimension timbers required. A planing mill is operated in connection with it. The saw mill employes 25 men and has a capacity of about 15,000 ft. B. M. of timber daily. All waste slabs and refuse from this mill are carried to the boiler room by a continuous belt conveyor and are dumped opposite the fire doors where they are used as fuel.

Practically all material in this yard is handled mechanically. A stiff leg derrick on a fixed support loads the material from the saw mill onto trams for the cylinders. After treatment the material is transferred from the trams into cars by a guyed stationary American derrick at the other end of the yard. In addition a Brownhoist locomotive crane with a 50-ft. boom loads the piling directly from the water onto cars and performs such other work about the yard as may be necessary. All material is loaded for shipment as fast as it is treated, to the extent that cars are available and none is stored permanently at the plant.

This plant has been built and is being operated under the direction of W. H. Courtenay, chief engineer of the Louisville & Nashville, with John B. Lindsay, superintendent of timber treating plants, and P. T. Vaughan, assistant superintendent, directly in charge. The buildings were erected by the Meacham Contracting Company, Hopkinsville, Ky., while the piping was installed by J. M. Foley, Birmingham, Ala. The Power and Mining Machinery Co., Cudahy, Wis., furnished the new 133-ft. cylinder and the new section of the 6-ft. cylinder, while the tram cars were manufactured by the Allis-Chalmers Mfg. Co. of Milwaukee, Wis.

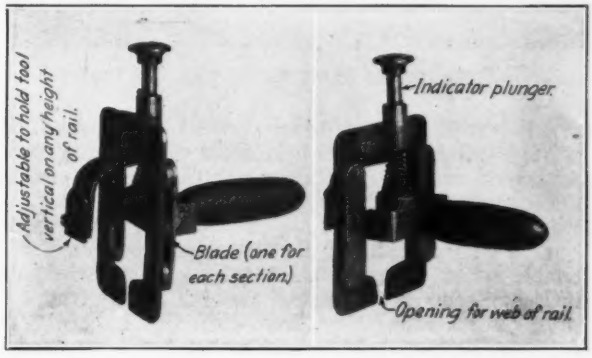
PERE MARQUETTE TRACK INSPECTION

AS a result of the annual track inspection on the Pere Marquette, the Detroit-Canadian division, J. J. Corcoran, superintendent, and W. J. Long, division engineer, received the highest division rating, although the Chicago-Petoskey division was only 2½ points behind. The track on the Detroit-Canadian division is in charge of William Meier, roadmaster at Grand Ledge, Mich., and Harry Morris, roadmaster at Walkerville, Ont. Roadmaster William Meier also received the highest rating (92.6) among the roadmasters, while L. Seger, section foreman at Brighton, Mich., received the highest rating for a section foreman, this being the second year he has won this recognition. The special prize awarded to the roadmaster whose territory showed the greatest improvement went to F. J. Meier, roadmaster on the Chicago division at Benton Harbor, Mich.

The following section foremen also received the highest ratings on their respective roadmasters' districts: L. Seger, Brighton, Mich.; William Krajewski, Wyoming, Mich.; William Harris, Fennville, Mich.; William Chadley, Mecosta, Mich.; Wm. F. Bailey, Montague, Mich.; L. Lawrence, Freeland, Mich.; J. Mentel, Erie, Mich.; C. Sexton, Bellaire, Mich.; Wm. Moulton, Hemlock, Mich.; Wm. Ebmeyer, Baldwin, Mich.; Richard Morgan, Carsonville, Mich., and Lewis Wilmott, Dresden, Ont.

A RAIL CALIPER

THE accompanying photographs show a gage or caliper which has been adopted at the rail-reclaiming plant of the Chicago, Milwaukee & St. Paul at Savanna, Ill., during the past year to measure accurately the height of relaying rails preliminary to sorting them according to the depth of the head, to secure uniform surface at the joints and easy riding track. Until recently a gage


Adjustable to hold tool vertical on any height of rail.
Blade (one for each section)
Indicator plunger
Opening for web of rail

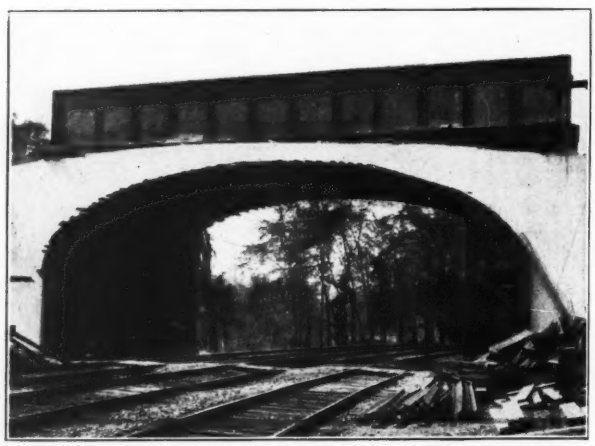
TWO VIEWS OF THE RAIL CALIPER

was used which calipered the rail over all, but it was found that owing to the accumulation of dirt and rust and to abrasion on the base of the rail this method was inaccurate, particularly when the instrument was handled by an inexperienced or careless workman. In designing this recent instrument it was desired to secure measurements at a point removed from the end of a newly-sawed rail, where it would not come in contact with any burr raised by the saw and not properly removed by the chippers and to secure contact with the clean solid metal of the head of the rail. As the fishing height is uniform in sawed rails after the splice wear has been removed by cropping the ends the abutting surfaces on rails of uniform thickness of head will be even after applying the splice.

This instrument can be used on any section of rail by simply inserting the proper blades. This is accomplished by the removal of two screws and the blade. The gage is used at the Savanna plant to sort all sawed rails selected for use in main track into four different groups, varying 1/32 in. in the thickness of the head, from full section down to the minimum considered permissible for rails to be used in main track. We are indebted to John Reinehr, foreman of the rail mill at Savanna, Ill., for this information.

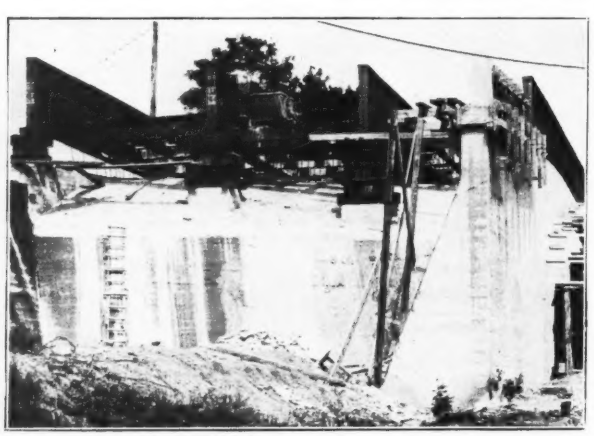
NOVEL METHOD OF SUPPORTING ARCH CENTERS

AS a part of the improvements now under way on its Morris and Essex division, the Delaware, Lackawanna & Western is completing a reinforced concrete arch bridge over its tracks at Millburn, N. J., that is of interest because of the manner in which an unobstructed clearance was maintained for trains during construction. As the line, which is three-tracked at this point, carries a very heavy commuter traffic in the morning and evening, it was not practical to take any of the tracks out of service during construction in order to place the usual falsework posts. As a further complication the vertical distance available between the top of rail and the highway grade was too small to permit the use of steel arch centers without reducing the top clearance to an undesirable extent. To meet this situation it was decided as a matter of economy to suspend the arch centers from old plate girders rather than from steel ribs embedded in concrete, a practice which had been adopted previously.



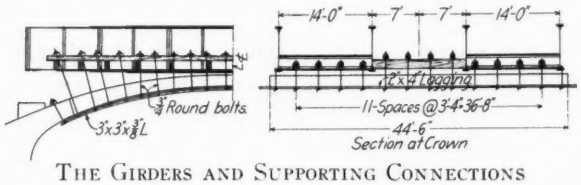
THE GIRDERS SUPPORTING THE CENTERS

The details of construction which were worked out as the design was made, provided for building the abutments, together with portions of the arch ring constructed at cantilevers. These cantilever sections were built out from the abutment to the limit of the side clearance on segmental forms supported on falsework bents, placed parallel to the tracks and, when completed, left an intervening 45-ft. span between the arms of the cantilevers where it was necessary to suspend the centering.



END VIEW OF THE GIRDERS IN POSITION

On the completion of the abutments and the cantilever arms, four plate girders, each 60 ft. long and 6 ft. deep, were brought in and placed. The outside girders were supported on blocking placed on the sidewalls of the abutments and the inner two on concrete piers erected for this purpose on the slope of the abutments. The steel floor beams were then bolted to the girders as in ordinary bridge construction. Between the center girders timber crossbeams were used instead of steel. This floor system supported the 12-in. by 12-in. stringers that carried the centering which consisted of 3-in. by 3-in angles that ran lengthwise of the bridge and conform to the curve of the arch. The centering was suspended from the stringers by ¾-in. rods placed 3 ft., center to center, and provided with adjusting screws at the top so that the proper curve might be maintained. These rods were placed in pipes so that they might be removed from the finished work readily.



THE GIRDERS AND SUPPORTING CONNECTIONS

In similar structures previously erected by this railroad it has been the custom to suspend the arch centers from steel ribs embedded in concrete, but with the present high cost of steel it was found that the use of the girders was economical. While some difficulty was experienced in concreting because of the small clearance between the tops of the ribs and the suspension girders the method proved very successful.

The bridge was designed and constructed under the general supervision of G. J. Ray, chief engineer of the Lackawanna and George T. Hand, division engineer. G. B. Barackman, assistant engineer, was in charge of construction and A. B. Cohen was the designing engineer.

COMMITTEES OF ROADMASTERS' ASSOCIATION

AT a meeting of the executive committee of the Roadmasters' and Maintenance of Way Association, held in Chicago on October 21, the following subjects were selected for consideration at the next annual convention, with the chairmen of the committees as follows:

Methods of Securing and Retaining Track Laborers. A. M. Clough, supervisor, New York Central, Batavia, N. Y.

Recommended Methods for the Inspection of Ties in Track and the Most Efficient Plan for Making Renewals. J. B. Oatman, roadmaster, Buffalo, Rochester & Pittsburgh, DuBois, Pa.

The Proper Method of Maintaining Track Surface. J. E. McNeil, inspector of track and roadway, Atchison, Topeka & Santa Fe, Los Angeles, Cal.

Equating Track Values. A. Grills, general roadmaster, Grand Trunk, St. Thomas, Ont.

Methods of Snow Removal from Switches and Tracks and Recommended Types of Brooms, Thawing Appliances and Tools. T. Thompson, roadmaster, Atchison, Topeka & Santa Fe, Joliet, Ill.

Individual papers will also be presented on the following:

Some of the Difficulties of Maintaining Tracks in Large Terminals, by C. J. Coon, New York Central, New York.

The Oiling of Rails and Fastenings to Protect Them from Corrosion, by E. T. Howson, *Railway Maintenance Engineer.*

Economical Methods of Maintaining Street and Highway Crossings, by M. Griffin, supervisor, Central Railroad of New Jersey, Jersey City, N. J.

TRAINING YOUNG MEN FOR PROMOTION

The Application to the Maintenance Department of Principles Employed Successfully in the Mechanical Field

THE demand for trained, efficient foremen is a universal and pressing one in all branches of the maintenance of way department to-day. There is almost an equal dearth of material from which to create supervisors and roadmasters. The outlook for the future is even more discouraging for the class of men now being drawn into the ranks as laborers does not offer a promising field from which to recruit foremen. This condition is arising at a time when the demands which are being made on the maintenance of way department are more exacting than ever before and when the work requires a higher degree of intelligence and concentration than at any previous period.

With this shortage of foremen existing in a department employing one-fourth of all the men engaged in railway service, the need of some method of training is plainly evident. It would seem to be only a matter of sound business procedure to provide some means whereby this condition will be relieved and men eligible for promotion and trained in the methods of the company will be waiting for these positions. The most logical way to provide such a corps of men is through an apprentice course or school of training. Up to the present time no road has established any such system in the maintenance of way department in any comprehensive manner. It is true that plans have been started in a minor way but they have not been tried sufficiently long or on a large enough scale to demonstrate their practicability and have been discontinued before the results could be ascertained.

A similar shortage of trained men exists to a lesser degree in the mechanical department where the officers have been more prompt to realize the condition and the apprentice system has received greater attention. One of the roads which has developed this system most successfully in the mechanical department is the Atchison, Topeka & Santa Fe. The methods developed on that road were described in detail in a paper read before the New York Railway Club on October 20 by F. W. Thomas, supervisor of apprentices on the Santa Fe. While this paper relates directly to the work being done in the mechanical department the parallel between this branch of the service and the maintenance of way department is so close that we publish an abstract of this paper below in the belief that our readers will see the application of these methods to their own department and endeavor to determine for themselves the extent to which similar methods are practical in the maintenance of way department.

The fundamental principles which have been applied here are equally well adapted to the maintenance of way department, the modifications necessary consisting almost entirely in details of administration. If young men can be secured as shop apprentices at wages ranging from $1 to $1.35 per day they can be secured equally well for out-of-door work in the maintenance of way department, where the unskilled laborers' rates the past season have ranged from $1.85 to $2.25. The opportunity to collect the men for instruction at a shop exists also in terminals where track apprentices may be divided between different gangs in one terminal or concentrated in one gang under a competent foreman. At the completion of a four-year course the men should be capable of becoming assistant foremen in large gangs or section foremen at salaries equal to those of machinists. The opportunity for promotion would likewise be open to them the same as to the machinists with corresponding increases in pay.

That this plan is not an idle dream is indicated by the fact that at least one large road is now working upon a definite form of organization and is planning to install the apprentice system on a large scale. When railway officers realize the importance of the economy of training young men according to their own standards, not only for minor positions in the maintenance of way department but for advancement to the higher positions as well, the shortage of capable foremen and supervisors will become a thing of the past and the economical and intelligent conduct of the work will be materially increased.

THE SANTA FE PLAN

By F. W. Thomas

The training of young men for positions of responsibility involves two considerations; the foundation upon which to build and the material with which you are to build. The solution of both of these by the Santa Fe requires a little explanation of the preparation of the raw material from which we may select the stones for the building. Our apprentice system was organized nine years ago.

Briefly, our scheme for training boys for our shops, is as follows: We take a boy who has completed grammar school or better and examine him as to his mental make-up. A series of simple arithmetical problems, coupled with the manner of filling out his formal application blank, and a personal interview, give us some idea of the boy's accuracy, industry and alertness. He then goes out in the shop to run the gauntlet of our shop instructors. They find out why he wants to be a machinist instead of a lawyer, or a boiler maker instead of an editor or a preacher, if some friend or parent sent him to us on account of the good wages paid mechanics, or if he is making application simply because his father was a machinist. We want to find out as much as possible about the boy from the boy himself. We do not ask any letters of reference. We do, however, strongly endeavor to get boys of good, honest parentage. If he passes the shop instructors he next goes to our surgeons and passes a physical examination. We are taking these young fellows in our service for life, and it is well that young men sound in body and mind should be selected.

If the doctor passes him the boy goes to the office of the superintendent of shops, filling out the regular indenture papers and minor's release, is given a letter to the shop foreman, who gives him a shop number, etc., and he is told to be on hand by the time the whistle blows in the morning. He enters the shop next morning.

The apprentice in the shop is constantly under the eye of the shop instructors and is taught how to perform each operation or step of the trade he has been indentured to learn. An exact account is kept of each job performed and the time required to perform it. His shop work is correlated with useful instruction in the apprentice school room. We teach him mechanical and free hand drawing, the elements of mechanics, shop arithmetic, and some other subjects, closely related to his actual shop work. A boiler maker apprentice, for instance, will have acquired a working knowledge of plane and descriptive geometry. He is familiar with the Fed-

eral rules as to the inspection and maintenance of boilers. He can quickly make you a sketch or a working drawing of a boiler, can lay out, flange, stay and build a boiler. At 21 years of age he is the equal of a boiler maker of 50 years. Throughout his four years apprenticeship he is hourly watched by general and shop foremen, by shop and school instructors. His weak points are strengthened, his strong features are exercised. Personal characteristic blanks are filled out from time to time which give the supervisor's office a graphic personal record. While the boy is serving his apprenticeship we find out his particular fitness, firmly convinced that the boy, now a man, will perform his duties better when his heart is in the work; if he can be placed on a class of work which he loves, he will certainly do better than if engaged on some work which he does not like.

RECRUITS FOR PROMOTION

The best worker will not necessarily make the best foreman, this we have long since learned. Those who have given evidence of possessing talent for leadership are selected for development. Possibly and very probably not all deserving ones are selected, but we are pretty sure that only those are selected who have given evidence of such ability. This is our first source of supply. The second is from our special apprentices, who are graduates of engineering schools.

Special apprentices are selected only upon a personal interview. We require these specials to work one year on machines, and one year on the erecting floor, then we decide whether or not he shall pursue our course for the development for positions of responsibility.

We now have the boy from the public schools, who has served his four years' journeyman apprenticeship and has become a first-class mechanic, and the college man who has engaged in practical shop work for two years; the pick of two sources for development into our future officers. They must, during their apprenticeship, have been quick to learn, industrious, prompt, honest, readily and effectively amenable to discipline, steady under fire, and popular with officers and associates, and then have some distinctive qualities of leadership.

TRAINING FOR FUTURE RESPONSIBILITY

We offer each of them the following opportunity: He must serve two months in the boiler shop, familiarizing himself with tubes, stays, patches, front ends, Federal laws, etc., pursuing a course of reading and study of boilers and appurtenances. He next goes to our freight car shop and serves two months on trucks, draft gears, body, doors, roof, air brakes and inspection, also pursuing a course of reading and study on car work, M. C. B. rules, etc. Then we send him to a busy roundhouse for four months. He may previously have had roundhouse work but he is now taught the operation of an engine house from the time a locomotive reaches the ash pit until it is headed out on the "ready to serve" track. Here he reads or studies some good books on locomotives. We next find him with the traveling engineer, studying fuel economics, learning to fire, to inspect and operate the engine, to make out the usual road foreman's report, accompanied by an individual study of parts of the machinery, the construction and operation of injectors, lubricators, safety valves, air brakes, valve motion, etc. He also familiarizes himself with the Federal and company rules for the inspection and care of locomotives. We next find him at the front door of our back shops or a large roundhouse, for thirty days engaged in inspecting incoming locomotives and thirty days inspecting outgoing locomotives. Once a month he has written a letter covering the work he has done, explaining the operation of certain features, offering suggestions as to shop management or methods, and criticizing local existing conditions when he can offer some remedy. In each branch of the above he must answer 150 questions bearing on the work in hand.

This is called our Special Course for Graduate Apprentices, and it keeps them very busy. We have so made this course that it is a trying and severe one, but it is certainly a developing one. A few break down under it or throw it up, but 80 per cent or over pursue it to the end.

OPPORTUNITY FOR OUTSIDE TRAINING

To prevent any possibility of our growing stale, we pick a number from this list of special course men and send them east. One year ago we brought six machinists and one boiler maker to the Baldwin Locomotive Works for a period of six months, where they were made assistant department foremen. They were given as much responsibility as they could carry and were changed from one department to another every two months. They acquired a general and detailed knowledge of the plant, executive and operative, from the time the material for a locomotive was ordered and received and on through the plant until it left the works a finished locomotive. They had an opportunity to note the practices of nearly all the roads in this country and many foreign nations. They were given, through the liberality of the Baldwin Locomotive Works, an opportunity of visiting a steel mill and studying the manufacture of steel. They were likewise treated with two half days at the Master Mechanics' convention at Atlantic City. Every two months the speaker was required to visit these young men in Philadelphia. These young men are back home again. They were not spoiled; they went back to their trade in the shop, but for a few days only. One is foreman of our Dallas terminal, one a roundhouse foreman in Kansas, one in Arizona, one machine foreman in Topeka, one welding engineer in charge of gas and electric welding and one machine foreman in California, all doing well. Seven more have taken their places at Baldwin's.

In like manner we sent four graduate apprentice passenger car men to the Pullman shops to catch on to the latest and best in steel car construction, two young painters to the Pullman shops to acquire the newest and best in painting, graining and decorating steel passenger cars. Four young fellows are at the Westinghouse Air Brake Company, mastering the manufacture of air brake equipment.

Each of the above young men was required twice a month to write me a letter giving in detail their observations and work during the past two weeks. These letters were remarkably interesting and will be of untold benefit to the young men in after years. The training this letter writing gave them could not be obtained so effectively in any other way. It required from two to five days a month for the author to thoroughly read and criticise these letters. The young fellows meet once a week and the letters are read over and discussed by them before sending. No changes are made in the original, though a postscript may be written. It gives each an opportunity of knowing what the other is doing, how he expresses himself, etc.

The law is laid down to us that we must not go outside for a mechanical officer. We must promote those who are now in service. The prize is hanging out to them and only when they fail us will we let outsiders enter the race. With this practice in vogue it would be very short-sighted to wait until the job was open to find a man. We believe in having a man ready for the job. We can't have a man ready at a moment's notice unless we are prudent enough to go into the matter a sufficient time ahead.

KNOW YOUR MEN

The weakness, or fitness, of a boy is not left to the judgment of one man. It is the result of four years of individual instruction. There is no such thing in our regular scheme as classes. There is no huddling together boys of all kinds, of all the various dispositions, capacity and intelligence, each boy from the moment he makes his application until the day we graduate him into manhood as a mechanic, is a class unto himself, is treated as a unit, and all the instruction we give him in shop and in school room is individual. We go further. We have a governing body known as the apprentice board, composed of our general foreman, department foremen, gang foremen, shop and school instructors, who meet as a trial court to pass on each boy eight times during his apprenticeship. This board is as fair and honest and equally as anxious to mete out real justice as any court or body of men that ever assembled to pass judgment on a fellow man. If the boy is fit they pass him. If he is a misfit he goes, and no power can save him. Like our courts, he may get a new trial. His case may be deferred, but justice will find him That board is even more anxious in removing the illfitted and talentless boy than it is to encourage and help the genius. It is deemed a crime against the railroad, a crime against society, a crime against the boy's young life to require him to stay and attempt to learn a trade when all his talent and all his ambition lies in other channels. When a boy completes his apprenticeship we know him and his capabilities. He may not be a leader, he may not be a world beater, but we know what he *can* do and where best to use him.

We have in our apprentice regulations of 22 articles, only two dont's for the boy. He must not smoke cigarettes, as the tendency of this practice is towards dishonesty. We say he must not drink, for who wants a booze fighter? The other 20 articles are there to safeguard the boy.

When we graduate an apprentice we continue a watchful supervision over him. If he remains at his graduating shop the local instructors keep an eye on him, helping and advising him when necessary. If we transfer him to a distant shop his "follow-up" card is sent ahead to the instructor, who aids him in getting located and in securing a good boarding place, etc. If he leaves the road, we still follow him. It may cost us a few postage stamps but the information is worth the stamps. So we have pretty nearly a perfect record of all our graduates. The location of 150 who have left us is as follows: On adjacent or connecting roads, 57; on distant roads, 14; in Canada, 4; "Somewhere in France," 2; in Panama assisting in operating the canal, 2; in garages, 37; in contract shops, 14; in business for themselves, 12; in the navy, 8.

The first position after leaving the ranks is the most trying of the young man's life. It is here he needs counsel and advice from old heads. We are prone, when entering on a new job, to try to do too much, to turn too many things upside down, to make a record the first month. Right here is where the young man is liable to fail, and a steady, guiding hand is needed to balance him. A master mechanic who had promoted a young fellow to a roundhouse foremanship at an important terminal, told me that for one solid week he spent eight of the ten hours per day in that house. That week made the young man one of the best roundhouse foremen on the system.

Has the game been worth the candle? Let me briefly recount the benefits we have enjoyed. From our apprentice system we have graduated over 900 first-class, skilled mechanics into our shop forces, trained and educated for Santa Fe work in Santa Fe ways, who in skillfulness, in general intelligence, in resourcefulness, in loyalty, are the superior of any equal body in similar vocations from any railroad or corporation of any place or any time. The present apprenticeship system has improved the whole moral tone of our shops. It has been the means of abolishing rawhiding and mule-driving. The use of profanity by officers to men has practically ceased, and the violation of Rule G is rare.

Of the graduates 72 per cent are in service to-day. When you think of the fact that the average turnover of men in the shops and manufacturing plants in the country is three and one-half years this is a flattering showing. Of the 72 per cent who have remained with us, over 100, or 15 per cent, have been promoted to some position of responsibility and we have others ready and waiting. The past year has been one of unusual activity, the biggest year in our history; yet we have not employed a mechanic from the outside for more than 12 months, and at our principal shops, Topeka, Kan., no skilled mechanic has been employed for over two years. These are the fruits of our recruiting and training system.

THE FIRST VALUATION REPORTS

THE Interstate Commerce Commission has issued tentative reports on the valuation of the Atlanta, Birmingham & Atlantic and the Texas & Midland as of June 30, 1914. These are the first reports to be issued in accordance with the valuation act of 1913. The tentative valuation of the Atlanta, Birmingham & Atlantic is stated as follows:

COMMON CARRIER PROPERTY

	Cost of Reproduction of Road and Equipment, Excluding Lands.		Present Value.
	New.	Less Depreciation.	of Lands.
Owned by A. B. & A.	$22,716,886	$18,071,950	$1,091,886
Leased to others	170,754	111,366	13,668
Used by A. B. & A., owned	22,546,132	17,960,584	1,078,218
Used, leased from others.	1,608,866	1,448,226	1,213,195
Total used by A. B. & A.	24,154,998	19,408,810	2,291,413

The value of the property used by the Atlanta, Birmingham & Atlantic is allocated to states as follows:

	Georgia.	Alabama.
Cost of reproduction, new	$12,383,707	$6,852,881
Cost of reproduction, less depreciation	10,184,690	6,195,360
Present value of lands	1,545,347	746,066

The value not allocated to states, including the equipment, is placed at $4,918,410 for the cost of reproduction, new, and $3,028,760 for the cost of reproduction, less depreciation.

The valuation of non-carrier lands, present value including improvements, is stated as follows:

Georgia	$141,782
Alabama	3,421
Total	$145,203

The original cost of the property could not be ascertained. The Atlanta, Birmingham & Atlantic was in the hands of receivers at the date of the report. The mileage owned at that time was 633.5 and its total outstanding capital liabilities amounted to $54,571,176.14 in addition to receivers' certificates amounting to $4,994,000. The property investment as shown by the books at that time was $53,325,751.58, of which the Interstate Commerce Commission took exception to $25,290,710.

These figures and those given below are based on the minimum valuation, all matters in dispute being omitted and left to the Interstate Commerce Commission for decision.

The tentative valuation on the property of the Texas Midland was stated as follows:

COMMON CARRIER PROPERTY

Road and equipment, exclusive of lands:	
Road wholly owned—	
Cost of reproduction, new	$2,601,289
Cost of reproduction, less depreciation	2,007,708
Jointly owned—	
Cost of reproduction, new	21,951
Cost of reproduction, less depreciation	18,208
Equipment—	
Cost of reproduction, new	582,071
Cost of reproduction, less depreciation	362,940
General expenses—	
Cost of reproduction, new	176,693
Cost of reproduction, less depreciation	138,561
Total cost of reproduction, new	$3,382,004
Total cost of reproduction, less depreciation	2,527,417
Land:	
1,862.52 acres owned and used for transportation purposes	$236,689.65
75.87 acres not held for transportation purposes and structures thereon	8,619.40

The original cost of this road could not be found. The original cost of equipment now in existence was stated as $528,874.59; of 1,369.91 acres of land purchased as $68,232.41 and of 492.61 acres donated (cost to the donors) as $43,103.75. The capitalization of the Texas Midland on June 30, 1914, was $2,112,000. It owned 111 miles of line.

Notices of these tentative valuations have been served on the attorney-general of the United States, the governors and the state commissions of the states in which the properties are located and the railroads. Each party is allowed 30 days from November 1 in which to file a protest with the commission. If no protest is made the tentative values will be considered as final. It is required that each protest filed shall include a specification setting forth in detail the particular items against which the protest is directed.

A NEW POLE JACK

THE difficulties attending the plumbing or pulling of telegraph, telephone or signal poles are being materially reduced with the introduction and use of a jack especially designed to facilitate these operations. The Simplex pole jack follows the general lines of the track jack, but gains its special adaptability through several modifications from ordinary construction and by the aid of a few accessories.

The head of the jack is given the form of a blunt, two-pronged tooth, which has the two-fold purpose of supplying two teeth to bite into the pole when straightening it and also provide a notch or groove with which to hold a chain (furnished with the jack) when lifting or pulling a pole. The most radical departure from ordinary design is the pivoting of the base of the jack so that the body of the jack may be placed in an inclined position as when straightening a pole, while the base remains horizontal. The efficiency of this feature is carried a step further by providing a section of 10-in. 25-lb. iron I-beam 2 ft. long to serve as a spread foundation for the jacks. It has the further advantage that when the flanges of the beam are pressed into the ground it offers a strong resistance against slipping when the jack is used in the inclined position.

Another convenient addition to the appliance is a two-position lever socket whereby the lever handle may be kept in a convenient working position for either the inclined or the vertical positions of the jack. The lever handle is a five-foot steel bar designed to serve also as a pinch bar.

This jack has a capacity of 15 tons and a total height of 39 in., affording a lift of 24 in. The total weight of

STRAIGHTENING A POLE

the equipment is 189 lb., but the jack itself without the accessories weighs only 90 lb.

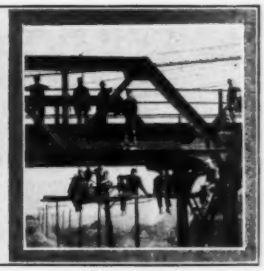
The use of this jack is said to result in economy and increased safety when pulling poles. It also claimed that poles can be straightened readily with the use of this

RAISING A POLE

jack by one man. The jack will hold a pole in position so that a workman can step aside to ascertain if it has been properly lined up. These jacks are manufactured by Templeton, Kenly & Company, Limited, Chicago.

THE PAINTERS' CONVENTION

The Thirteenth Annual Meeting Brought Out a Number of Practical Papers



THE thirteenth annual convention of the Maintenance of Way Master Painters' Association of the United States and Canada was held at the Hotel Walton, Philadelphia, on October 17 to 19, inclusive, as reported briefly in the *Railway Maintenance Engineer* for November. About 40 members were in attendance and a healthy interest was displayed in the proceedings of the various sessions.

The officers of the association during the past year were: President, F. C. Rieboldt, master painter, Chicago, Milwaukee & St. Paul, Milwaukee, Wis.; first vice-president, H. E. Conrad, master painter, Pennsylvania Railroad, Huntington, Pa.; second vice-president, A. E. Wilson, master painter, New York, New Haven & Hartford, Hartford, Conn.; secretary-treasurer, F. W. Hager, master painter, Fort Worth & Denver, Fort Worth, Tex. All of these officers were re-elected for the coming year. The next convention will be held at Cleveland, Ohio, on October 16 to 18, inclusive, 1917.

Thomas B. Smith, mayor of Philadelphia, and Charles E. Tryon, representing the Philadelphia Chamber of Commerce, welcomed the convention to Philadelphia at its opening session. In his presidential address, F. E. Rieboldt recommended certain changes in the constitution and by-laws which would expedite the business of the Association. He also referred to a movement on foot to bring about an amalgamation with the American Railway Bridge and Building Association, a matter which was brought to a head later when a telegram was received from the latter association, then in convention at New Orleans, La., in which the members of the Maintenance of Way Master Painters' Association were invited to become members of the Bridge and Building Association and suggesting the formation of a joint committee to facilitate negotiations. After considerable discussion of the subject, the convention in session at Philadelphia notified the Bridge and Building Association of its appreciation of the invitation, but declined to accept the offer at the present time.

L. P. Nemzek (John Lucas & Company), Gibbsboro, N. J., presented a paper on "Preservative Coatings for Iron and Steel," in which he recommended and gave reasons for the advantages of basic lead chromate in place of the commonly used oxide, red lead. H. A. Gardner (Institute of Industrial Research, Washington, D. C.) gave an illustrated lecture on "Physical Characteristics of Pigments and Paints," which included reference to the possibilities of kukin oil, the oil of the soya bean and perilla and china wood oils. Pigments were considered from the standpoint of hiding power, oil absorption, opaqueness, suspension, etc. He prefers red lead containing 15 per cent of litharge. In commenting on this, A. H. Sabin, National Lead Company, New York, stated that an addition of 10 per cent of litharge to a strictly high grade red lead containing originally less than two per cent (PbO) would give a harder film and produce better results for the interior of a water tank. On the other hand, freedom from litharge is important for the weather exposure on the outside of the same tank as on other general work.

A. B. Phelps, master painter, New York Central Lines West of Buffalo, in a paper entitled, "What This Association Has Done for the Railroads," reviewed the experiences of the roads of this country with brine drippings from refrigerator cars which have caused incalculable damage to rails, fastenings and steel bridges. He called attention to the fact that the Maintenance of Way Master Painters' Association at its convention in 1909 passed a resolution recommending that all refrigerator cars be provided with containers which would eliminate the dripping of brine while in transit. The initiative thus taken led to discussions by other railway organizations, resulting finally in an interchange rule effective October 1, 1916, which requires the equipment of refrigerator cars in this manner. He stated further that he believed it was the duty of the members of this association to keep a close watch on the practical working of this rule and to call attention to any laxity in its enforcement.

A paper by Malcolm McNaughton (Joseph Dixon Crucible Company) entitled "The Influence of Pigment on Paint Permanency," gave a review of the various properties of a pigment necessary to produce a permanent paint and described the action of graphite with respect to the various requirements imposed. "The Sanitary Value of Paint" was the subject of a paper by E. W. Lutes (Sherwin-Williams Company, Cleveland, Ohio), in which he called attention to the psychological value of paint in encouraging neatness on the part of the employees and the general public.

H. E. Conrad, master painter, Pennsylvania Railroad, Huntingdon, Pa., presented a brief manual of instructions for the master painter under the title, "The Master Painter and His Relation to the Corporation." This covered such matters as the records of material, prevention of waste, safety, co-operation, and treatment of the men with respect to discipline and welfare. The discussion of this paper dwelt particularly on the welfare feature, with special reference to the encouragement of athletics as carried out on the Pennsylvania Railroad. There was also considerable discussion with reference to records and accounts. The subject was considered of sufficient importance for presentation at another convention. "The Benefits the Railways Receive from This Association Through Its Members" was the subject of a paper presented by Ole Stubstad, master painter, Chicago & Northwestern, Winona, Minn. In addition to the discussion of the formal papers presented, considerable discussion was given informally to a number of assigned subjects, which included the painting of mahogany wood, both in matching old wood with new and genuine mahogany with birch, baywood and others; methods for reaching the tops of stacks to be painted; economy of the use of motor cars, and the use of ladder jacks suitable for reaching difficult or awkward positions. The entertainment features of the convention included a smoker, a banquet and a tour of the city of Philadelphia to points

of general and historic interest, which were tendered the membership by the representatives of the supply companies.

The following are abstracts of other papers presented:

MAINTENANCE PAINTING OF BRIDGES

By W. S. LACHER
Associate Editor, Railway Maintenance Engineer

Most discussions relative to the painting of steel bridges have been restricted to a comparison of the various classes of paints or to a consideration of the conditions affecting the shop and field coats of new bridges. Little has been said or written concerning their repainting. A single important exception to be noted is the report of the committee on Iron and Steel Structures of the American Railway Engineering Association for 1915. This gives in tabular form replies from 47 roads to eight questions and refers particularly to the kinds of paint, the equipment used and the results obtained. This report does not cover the manner or organization for determining the need of painting or the methods actually used in carrying out the work, and as the economy and effectiveness of the painting are very largely dependent upon these factors, they have been taken as the subject of this paper.

An investigation discloses a wide variation in practice, particularly as to the classes of men employed, and the organization and methods for conducting this work, part of which may be accounted for by variations in local conditions, the personnel or the general scheme of organization in effect on the several roads. The reasons for some of the other differences, however, are not so clear.

ADMINISTRATION

From replies received by the committee on Iron and Steel Structures, mentioned above, it is apparent that the length of the intervals between repainting is governed by no definite law. One road reports the interval as 1, 2 or 4 years; another 8 or 10 years, and a third 5 to 15 years. Climatic conditions have a large influence. Bridges in arid or semi-arid regions do not need as frequent attention as those in humid districts or those in locations where the air is heavily laden with furnace gases or where they are subject to salt fogs, or are partly submerged at high tide.

Another cause for the variation is the difference in the amount of attention given the bridges. On some roads, unfortunately, bridges are not repainted until the previous coat has almost disappeared. On other lines, the complete repainting is deferred at a material saving by the systematic touching up from time to time of the parts subject to the quickest deterioration. On the Santa Fe it is the practice to repaint or retouch a bridge whenever the weather coat has deteriorated sufficiently to expose the body coat underneath, the idea being to avoid if possible the removal of the body coat. The expense of cleaning off rust is thus avoided very largely.

The failure to repaint railroad bridges can almost always be accounted for by a lack of the necessary funds. When a reduction in earnings makes a reduction in maintenance expenses imperative the painting schedule is one of the first to be cut because the failure to paint a bridge when the new coat is needed has no immediate effect upon the efficient operation of trains. The work is put off for this reason, although the maintenance officers realize that it will result in a greater expenditure at some later date.

F. C. RIEBOLDT
President

The decision to repaint a bridge is determined almost universally by the condition of the structure rather than by the interval since the last painting, the condition being determined by inspection as carried out according to various schedules. These inspections are usually made individually or jointly by master carpenters, engineers maintenance of way, bridge inspectors, or bridge engineers, at least once each year. On the Canadian Pacific the division superintendents and the division engineers inspect all bridges in the fall, while the resident engineers and the master carpenters give all truss bridges and high viaducts an additional inspection in the spring. On the Chicago & North Western, independent inspections and recommendations are made by the general bridge inspector or his assistants, and the division maintenance officers, the two sets of recommendations being checked against each other in determining the work to be authorized. On the Burlington, all steel bridges of any importance are inspected personally by the bridge engineer.

As a rule, the repainting of a bridge is authorized as a part of the annual bridge maintenance budget, which gives authority in detail for the individual structures. A less common practice is to provide a sum for bridge painting by divisions, leaving the detailed distribution to the division engineer maintenance of way or the master carpenter, subject no doubt in most cases to the recommendations of the master painter.

Most roads do maintenance bridge painting with company forces, generally under the direction of the division master painter. The work is usually done by a division paint gang, which paints all classes of structures, as there is rarely enough work within the limits of the district ordinarily covered by a single division organization to keep a gang of bridge painters constantly at work on steel bridges. There are several disadvantages to this plan. House painters do not like bridge painting, particularly the work of cleaning off rust. They are not as skillful as the regular bridge painters in swinging staging or moving around on high structures. To obtain the latter class of men, some roads organize temporary bridge painting gangs every season, a reliable, experienced man usually being kept on the permanent force to hire the men and supervise the work.

On the Chicago & Alton, a combination of the two schemes is used, a special steel paint gang being organized only when there is a considerable amount of this work to be done. The Michigan Central maintains two permanent bridge-painting gangs, consisting of a foreman and eight men each, one gang working in the United States and the other in Canada. They are under the direct supervision of the bridge engineer. The New York Central has general paint gangs on branches where the

bridge and building work is under the direction of one supervisor, and separate steel paint gangs on main lines where the bridges and buildings are generally handled by separate supervisors. On the Pennsylvania Railroad, painters from the locomotive repair shops are occasionally used on bridges.

Whenever repair work is done on steel bridges, it is common to have the iron bridge men do any touching up or spot painting that may be necessary. The Chicago & North Western has used iron bridge men successfully on complete repainting jobs. These men are more agile and skillful in moving about in high places and are said to work faster. The Baltimore & Ohio lays particular emphasis on these qualifications in the selection of bridge painters.

H. E. CONRAD
Vice-President

Several roads contract all or a part of their maintenance bridge painting. This does away with the need of an organization for that purpose, the nucleus of which must be held over during the slack period. The same influences have been felt on this work which have caused the tendency towards contract work in other branches of the maintenance of way department, chief among which is the greater latitude allowed a contractor in the payment and selection of his men. Probably the most important reason for this has been the difficulty in obtaining capable foremen. The requirements are exacting. A foreman must not only be able to handle men, organize a new force each year, teach green men how to apply paint correctly and understand the safe swinging of scaffolds on high structures, but he must also be able to turn his hand during slack seasons to almost any other class of painting, including high grade interior work. Men of these qualifications are not always available.

The Chicago & North Western does a large part of the bridge painting by contract, the contracts being let by the engineer maintenance of way in units of a season's work for one division. The division engineer appoints an inspector, who is kept on the work constantly and the work is also given considerable attention by the division engineer and the master carpenter. This arrangement has given good satisfaction. The contractor furnishes the labor and equipment and the railroad company supplies the paint.

On the Canadian Pacific, repainting is contracted occasionally, depending upon the location, steel tonnage, nature of the structures, etc. In doing this work by contract, the railway supplies the paint at the nearest station and the contractor furnishes all labor and equipment. The contract usually provides one price per ton for painting and another for cleaning and scraping.

The Chicago Great Western has had a contract in effect for the last six years which is to be continued indefinitely until canceled at the option of the railroad or the contractor. Under this arrangement the contractor is required to paint any steel structure whenever the repainting is authorized, at an established price, which is on a tonnage basis for bridges and on a square foot basis for sheet metal work, such as coaling stations. The price includes a guarantee to maintain the paint on each structure for a period of 10 years from the date of painting it, the necessity for repainting or touching up to be determined by the railway maintenance officers. To establish the guarantee, a definite lump sum surety bond was required at the outset, and in addition the railroad company withholds for the 10 years 20 per cent of the funds due to the contractor on each job. After these deductions amounted to a specified sum, the surety bond was released. There is a further clause which specifies the maximum amount which the railway company can withhold. The contractor furnishes all labor and equipment as well as the paint.

WORKMANSHIP

As the work is now conducted on most railways, the economy and quality of the painting depends very largely upon the judgment, experience and general reliability of the paint foremen, supplemented by occasional inspection and general supervision by their superior officers. On the Michigan Central, the Frisco and the Burlington, standard instructions have been issued which specify the manner in which all the details of the work shall be carried out. In view of the frequent use on this work of men who do not possess the trade knowledge of the skilled painter, the benefits of such instructions cannot be doubted.

The importance of thorough cleaning cannot be emphasized too strongly. Cleaning is dirty, arduous, monotonous work, which it is difficult to get men to do properly. The work includes brushing of loose, light scale, the scraping of tight rust, the chipping of heavy scale and the removal of the resulting dust with a painters' duster. All scale and rust, and loose, blistered or checked paint must be removed, but good paint surfaces should not be disturbed. Heavy coats of paint in a checked or cracked condition may be softened by the use of lye. Some roads specify how this shall be done. The Burlington instructions are as follows: "The lye, in the proportion of 1 lb. per 7½ gal. of water, should be brushed over the old work, allowed to stand till the paint is softened, and then brushed and washed off with water liberally applied. It will be necessary to use a hand force pump and hose for this, to remove every trace of lye from the old work." A blow torch may also be used for this purpose, while spots of oil should be removed with gasolene. On the Frisco, scrapers are made out of old flat files, and pean hammers are used for heavy scale.

A. E. WILSON
Vice-President

The sand blast seems to have had a very limited use in cleaning bridges, although a number of roads report favorable results. While this equipment affords the simplest means for securing an absolutely clean surface and while there are conditions under which its use will result in a material economy, it is at a disadvantage on bridge work because of the loss of the sand after it has been used. The removal of heavy scale with a sand

blast should not be attempted, as it requires the expenditure of an excessive amount of time and sand, and there is danger that the removal of the scale will be accompanied by the removal of an undue amount of sound steel from adjacent portions of the surface. Its primary object is the removal of the thin tight sticking coating of rust and the thorough cleaning of the surface. For this purpose no other method can equal it. Owing to the rapidity with which a thin film of rust will be formed, surfaces cleaned by the sand blast should be painted immediately. The use of the sand blast has been found valuable under certain circumstances, and several roads have purchased a number of outfits, which are transferred from division to division, as conditions arise demanding their use. One objection which has been raised to the use of the sand blast is that it necessitates the spurring out of a compressor car, an item that will add an expensive charge to a small job. However, there are now on the market compressors mounted on skids that can be unloaded at the site of the bridge with small effort or loss of time.

F. W. HAGAR
Secretary-Treasurer

The greater susceptibility of certain parts of a bridge to agencies tending to shorten the life of the paint, point to the economy of frequent repainting of those portions as, for instance, the floor system, or the touching up or spot painting of affected parts. Another practice is the double coating of portions in the poorest condition. This is accomplished by cleaning all rusty parts and spot painting them with a body paint. After this has dried thoroughly, the bridge is given a complete new weather coat.

A difference exists as to the practice on special features, as, for instance, the top flange of stringers. The usual practice is to leave the ties undisturbed, painting the stringers between them and to leave the parts covered by the ties to be painted by the bridge carpenters whenever the ties are renewed. On the other hand, at least one road requires its painters to jack up the ties so that the tops of the stringers may be painted completely at one time.

SPECIAL CONDITIONS

Many roads, particularly lines handling solid trains of refrigerator cars, have suffered for years from the effect of brine drippings and various remedies have been suggested and applied from time to time. The covering of the top flanges of floor beams and stringers with felt or paper treated with hot bitumen compounds, advocated some years ago, has been abandoned. Most engineers offer no solution other than to repaint the affected parts frequently or to provide some means to deflect or shed the brine so that it will not come in contact with the steel. The Michigan Central has used wood strips between the ties for this purpose, while the Frisco has used old galvanized iron sheets. A number of experiments are now in progress which involve the use of coatings or protections of various kinds, none of which have been adopted thus far as standard practice. The Burlington is using a coal tar paint and the Michigan Central is filling up the corners on the tops of bottom flanges with cement mortar, first cleaning the surface and coating it with asphalt primer or tar cement paint. The New York Central has experimented with special paint, coatings of coal tar and cement mixtures.

The paint on the under side of bridges, subject to the action of smoke and cinders from engines passing underneath, deteriorates very rapidly, being subject to well-known destructive agents, corrosive gases and cinder blast. The latter is effective only where the smoke stacks are but a few feet below the metal surface.

That the influence of gas is severe is indicated by the fact that the constructions designed to eliminate paint have not always been a success. Even concrete-encased I-beam spans have shown serious deterioration, although, as in the case of the painted steel work, it is not clear whether the gas alone caused the trouble, or whether poor design and workmanship were partly to blame. It suffices to say that good drainage is absolutely essential for either the concrete or the steel bridge. The action of the gases is not nearly as severe where moisture is not present. Ventilation should also be obtained if possible. These difficulties have led to the use of reinforced concrete wherever possible. The application of a relatively thin layer of concrete to the steel surfaces by means of the cement gun has also been used extensively. The New York Central reports favorably on the use of bitumen coating applied hot, stating that it resists the chemical action of the gases much better than ordinary paint.

The action of cinder blast is an entirely different problem. Where the conditions are severe, no paint, or even a concrete protection, can resist it. The only satisfactory solution would seem to be the introduction of a shield, which may be replaced as soon as it has been worn through. Steel and cast iron plates, asbestos lumber and even wooden boards have been used for this purpose. For the sake of economy and to avoid excessive interference with the ventilation, these shields are made only of sufficient width to receive all of the cinder blast of the stack.

DISCUSSION

A. H. Sabin stated that he believed it to be the duty of the railway master painters to make inspections of the highway bridges along the line of the railways and call the attention of citizens and public officers to the need of the proper care of such bridges. It was the consensus of opinion that the members could be of valuable assistance to the public in this way and that the railways would be glad to have them make an effort to enter into the public affairs of the communities in which they live, thereby furthering amicable relations between the public and the railways. The paper also brought forth some discussions of the spraying of paint on structural steel. H. E. Conrad stated that he had experienced no difficulty in carrying out the work by this process if the necessary pressure was available. He did not recommend the practice, however, as he believed that thorough brushing was necessary to obtain good results, although spraying proves of value where the work is inaccessible as in box girders, trough floors and the like. J. P. Lewis (Wabash) questioned the practicability of passing a heavy body paint through the spray. E. H. Brown called attention to the fact that carbon dioxide can be used to furnish the pressure for the spray and that compressed carbon dioxide is ready available in pressure tanks supplied to the trade for soda fountains and various other purposes. H. B. Wilson stated that he did not believe it

was desirable to brush down paint thin on places that were subject to considerable abrasion. This led to considerable discussion of the practice in applying paint to structural steel.

SAFETY FIRST

By M. F. EBEL

Master Painter, Cincinnati, Hamilton & Dayton, Hamilton, Ohio

In painting the interior of water softener tanks, care should be taken to provide ventilation so that all fumes from the paint can escape. Steel water tanks should be treated in the same way. Open lights or torches should be kept away from any material of a volatile nature. This applies also to cars containing paint materials and where possible a keg of sand should be kept in a convenient place, with a scoop that can be used readily to cover a fire with the sand.

All ropes, hooks, planks and ladders should be inspected from time to time, particularly at the time of taking them from the car. There is always a chance that something may have been injured, cracked or broken in moving it from the preceding job.

In washing interior walls and woodwork in station or other buildings that are wired for electric light, it is always well to turn off the current before starting the work, especially around sockets or connections. The use of a wet sponge in such a place may give a man a sufficient shock to throw him off a scaffold.

As in the case of all other railway employees, caution must be exercised in the use of hand, motor or push cars on the main tracks. Whenever there is any question as to the safety of the use of the car, as when handling a loaded push car, it must be protected both front and rear by flags.

APPLICATION OF FIRE RESISTING PAINT

By H. J. BARKLEY

Master Painter, Illinois Central, Carbondale, Ill.

Generally speaking, fire-resisting paints are divided into two general classes, one with a coal tar base and the other with a linseed oil base. A class by itself is the so-called water glass and common whitewash which was for years put on the insides of covered wooden bridges, a type of bridge that has almost ceased to exist.

The St. Louis division of the Illinois Central has a large number of open deck wooden trestles on branch lines, which we started to coat with fire-resisting paint in 1913. Both types of paint have been used since, and not a single dollar has since been lost by fire on any of the structures so treated. Previous to that time fires on such structures were frequent, causing a loss in time, traffic and money.

We found the best tool to be a half-worn four-inch wall brush made into a hatchet brush with a diagonal handle about four feet long. The coal tar product has to be heated, which is done in a 50-gal. iron kettle on the bank at the end of the bridge. Only the top and two sides of the guard rail and ties, the tops of stringers, caps and sub-sills where they are not covered with sheet metal, are coated. After a three years' trial we find that both types of paint have their advantages both as to covering capacity, permanency, and to actual fire-resisting qualities, for which we have tested them both in several ways.

Generally speaking, one gallon is figured for every four lineal feet of bridge. The temperature will affect the amount of material to some extent, as will also the size of the ties and whether they are surfaced or not.

The term "fire resisting" is often misused. A government report says that "There is no known way of making wood absolutely fireproof," but it is a fact that we can reduce the fire hazard to a great extent, as has been proved by demonstrations and by actual use. We know absolutely that coals of fire from a locomotive ash pan have caused countless fires and we also know that we can stop that kind of loss. A heavy timber structure in flames is another matter, but is a condition seldom encountered. In other words, fire-resisting paints seem to be a preventive rather than a cure.

It is my prediction that a greater amount of fire-resisting paints will be used in the future on timber bridges, coal chutes and like structures, not only on railroads, but in factories and the home.

DISCUSSION

Two other papers were presented which also covered the general subject of fire-resisting properties of paint, one by W. A. Clapp (Clapp Fire-Resisting Paint Company) on "Fire-Resisting Paints," and the other by G. F. Johnston (Pyroline Products Company), entitled "Reducing Fire Losses." In discussion of these papers, H. A. Gardner expressed the view that any good paint containing a mineral pigment has fire-resisting properties, since after the oil is driven off by the heat the surface is covered with a coating of purely mineral substances. E. H. Brown (Painters' Magazine) stated that he had found a heavy coat of lime whitewash, when protected from the weather, to be a good resistant. A number of the members spoke of their experiences with various formulæ containing whitewash as the principal ingredient.

ECONOMY OF SELECTING GOOD BRUSHES

By A. G. PRUETT

Foreman Painter, Chesapeake & Ohio, Richmond, Va.

Undoubtedly, the best brush to use is the round brush. In the hands of a skilled mechanic, the elastic round brush will spread and brush in paint better than any other. However, the lack of good mechanics who understand how to bridle and break in round brushes has led to the adoption by most painters of oval or flat brushes of various sizes. Set in rubber or cement, a good leather-bound, flat brush, size No. 30, is a good all-round brush for railroad work. A good oval brush is very good for painting bridges. A 1½-in. brush set in rubber makes a good sash tool.

The precaution taken by some painters to test the quality of the brushes they buy would seem decidedly worth while. The safest course is to buy only good quality brushes from reputable firms. Examine the brushes carefully and make tests that will indicate the presence of imitation bristles. The quality of the bristles determines almost entirely the quality of the brush. Good bristles taper, are split at the end and curl when burned, but do not flame. Imitation bristles burn like cotton. Horse hair does not taper, but has square ends and lacks the spring of the genuine bristles. It makes a flabby brush. Sometimes four or five different lengths of bristles are used in a high grade brush. Besides giving the proper spring and stiffness, the shorter bristles prevent the brush from becoming stubby after a little use. As the brush wears down, this shorter stock with its flag ends comes into service and the brush wears down evenly and maintains the proper working level.

For kalsomine work a No. 7 kalsomine brush with bristles 5½ in. long is desirable. One should see that there is not too much short stock in the center, nor imitation bristles in the brush. For varnishing, most painters prefer brushes that are set in rubber with metal ferrules. They are oval in shape and chisel edged. Great

care should be taken that no imitation bristles are present, as breaking bristles on a varnish job make serious trouble. Stippling brushes should be about 3½ in. wide by 9 in. long, the bristles should be stiff and strong with no short stock. For cleaning out filler from moldings or ornaments and for rubbing with pumice stone and oil or water, rubbing brushes are time and labor savers. They are more economical than burlap and other similar devices. They are made similar to dusters with tough bristles about an inch long.

A good flat duster is more desirable than a round one, especially on bridges over water, as the round ones are more apt to roll off. Flowing brushes, made of bear hair and ox hair, are time and money savers and give excellent results on special jobs. In painting radiators they flow the bronze on without leaving any brush marks, give a better luster to the bronze, spread the paint thinner and make it go farther. These brushes are thin and mounted on rather long handles, making it easy to paint the inside coils of the radiators.

Floor-waxing brushes are made very much like the rubbing brushes, except that they are larger, about six or eight inches, have a long handle and are weighted to about 25 lb.

Stencil brushes should be short, round and stubby. A good stencil brush can be made out of a round brush, bound short, though any round brush with good, even, springy bristles will serve the purpose. Where rust must be removed wire brushes of various shapes and sizes are required.

DISCUSSION

E. H. Brown commended the paper, but stated that the information it contained was of little use to the painter at the present time because of the impossibility of getting good bristle brushes under the existing market conditions. Before the beginning of the European war practically all high-grade bristles used in brushes came from Russia. These bristles were sold every year at the Nigni Novgorod fair, most of them going to Leipsig, where there was an extensive industry in the sorting and cleaning of these bristles preparatory to their use in brushes. Since the war, this commerce has been interrupted and nothing has been arranged that definitely takes its place. He also stated that bristles are produced in quantities in China, but this market is at present in an unsettled state on account of the activity of the Japanese in obtaining control of it.

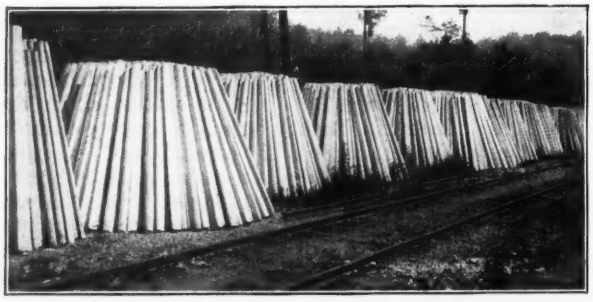
A Concrete Post Plant on the Lackawanna

A Small Force Is Enabled to Produce a Considerable Output by Utilizing By-products of Ballast Crushing Plant

THE Delaware, Lackawanna & Western operates a concrete fence post plant at Hog Mountain quarry, about two miles east of Boonton, N. J., where the road has a crushing plant for the production of broken stone ballast. The stone is an excellent grade of granite and the material passing a ¾-in. screen, which is not used for ballast, is employed in the manufacture of the concrete posts.

THE PLANT

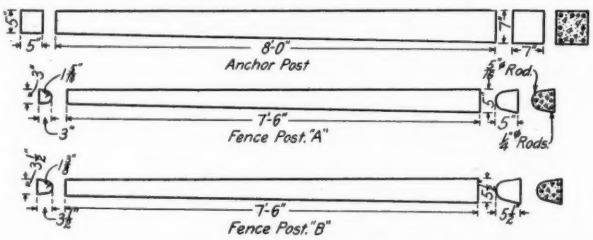
The plant consists of a seasoning room, a mixing room and a cement storage house. The seasoning room is 40 ft. wide by 50 ft. long, and is equipped with racks on which to place the molds during the seasoning of the posts. It also contains a 15-hp. upright boiler, located in the center of the room, for heating during the winter season when the crushing plant is idle. The mixing room



PILE OF COMPLETED POSTS

is 16 ft. wide and 20 ft. long and is adjacent to one end of the seasoning room. It contains a ½-cu. yd. Smith mixer, with an upright engine to drive it, and also a small engine to drive the conveyor, which handles the stone from the crushers to storage bins which hold about 30 cu. yd. of stone. The room also contains benches for cleaning, oiling and filling the molds. The cement storage house and the sand bins are located convenient to the mixing room.

In the operation of this plant the stone passes from the bins through a gate to measuring boxes which empty directly into the mixer, avoiding all manual handling of



LINE AND CORNER POSTS

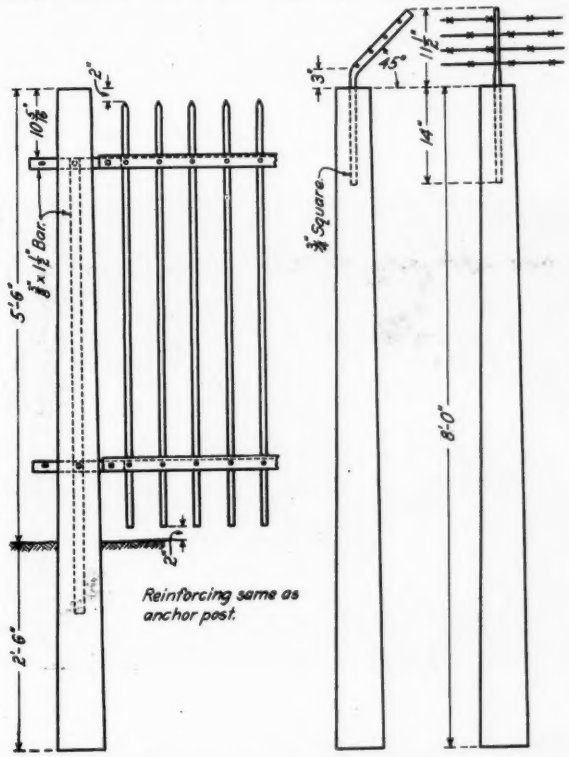
the stone. The sand and cement are handled from the cement house and sand bins to the mixer by hand. Metal molds furnished by the D. & A. Post Mold Company, Three Rivers, Mich., have been used in this plant since 1910. These molds are carefully cleaned and thoroughly oiled just before using them each time, to insure a smooth surface for the finished post and to prevent the concrete from sticking to the molds. After cleaning and oiling they are passed to the shaker rack of the molding machine, where the reinforcement is placed and the concrete is poured. This shaker rack will handle 8 molds at a time, and is provided with a longitudinal shaking motion which serves to shake and settle the concrete in the molds and insure proper density and a smooth, weatherproof surface. After adequate shaking the posts are transferred to the seasoning room in the molds in which they are allowed to remain for a period of 30 to 60 hours, depending upon the weather conditions. After the seasoning they are placed on a car and transferred to the storage ground, some 300 ft. from the plant, where

they are unloaded and stored on end in piles ready for shipment.

During the summer season the plant is operated at the rate of 200 posts per day. In the winter the force is reduced and the output is 100 posts per day. The winter force consists of a foreman, who also runs the engine and feeds the mixer, one man to clean and oil the molds and two men to fill the molds, place the reinforcements and transfer the molds to the seasoning racks in the seasoning room. During the summer season this force is augmented by four men who rack and load posts on cars and unload all material received.

DETAILS OF THE POSTS

Four types of posts are manufactured, as shown on the accompanying drawing, viz.: A standard line post, an anchor brace or corner post, an iron fence post and a barbed wire special post. The line post is made in a "U" shape mold, 7 ft. 6 in. long, tapering from 3½ in. at



IRON FENCE AND BARBED WIRE POSTS

the top to 5½ in. at the bottom. Wire fence connections are made by looping a tie wire around the posts, Western Union style. These posts each contain 0.16 bags of cement, 0.31 cu. ft. of sand and 0.6 cu. ft. of ¾-in. stone. The cost of the post, including material and labor, is 19 cents. The corner post is 8 ft. long, of square section tapering from 7 in. to 5 in., and costs 38 cents.

The post used for iron fences is of the same shape and size as the corner post, but is reinforced with an iron bar, ⅜ in. by 1½ in. in section, 5 ft. 6 in. long, located in the center of the post and to which are riveted short cross pieces of the same section of sufficient length to project beyond the faces of the post and serve as convenient connections for the horizontals of an iron railing. These posts cost 94 cents each. A further modification of the corner post is the "barbed wire special" for use in locations on the right of way where it is desired to offer the maximum obstacle to climbing over the fence. The reinforcement of this post is identical with that of the corner post (four bars), except that a ¾-in. square bar is set in the top of the post with a projection of about 14 in., bent at an angle of 45 deg. with the axis of the post and punched with ¼-in. holes for fastening barbed wire. Posts of this type cost 69 cents each.

EXPERIENCE WITH THE POSTS

Part of the first year's operation in the manufacture of the posts was along experimental lines, special attention being given the various kinds of reinforcement. The first reinforcement used consisted of flat bars of hoop steel ⅝ in. wide and No. 18 gage, using four pieces of this reinforcement to the post, uniformly spaced about ½ in. inside of the surface. A large number of posts were manufactured with this type of reinforcement and proved entirely satisfactory. Later round rods were substituted for the flat bars and are used at the present time.

In the standard post this reinforcement consists of one 5/16-in. rod in the bottom of the mold and two ¼-in. rods near the top of the mold; that is, on the flat side of the post near each corner. A third ¼-in. rod, half the length of the others is placed in the face of the post so as to project about 24 in. above the ground level, and thus increase the strength of the lower portion of the post.

The posts were first made with a mixture of stone dust with stone passing a ¾-in. ring and held on a ¼-in. screen, thus using practically the entire by-product of the crushing plant and eliminating the use of sand. This proved unsatisfactory, however, as the stone dust contained a considerable portion of clay and dirt. As a result of this experience the standard mixture is now one part cement, two parts washed sand and four parts stone, passing a ¾-in. ring and retained on a ¼-in. screen.

In loading the posts in cars it is the practice to pack them in wood shavings and clippings from the adzing and boring plant. This reduces the breakages to a minimum.

Since opening the plant in August, 1910, 100,000 posts have been manufactured, of which 75,000 are the standard line posts, the rest consisting of the various special posts. This plant is operated under the direction of A. J. Neafie, principal assistant engineer, Delaware, Lackawanna & Western, to whom we are indebted for the above information.

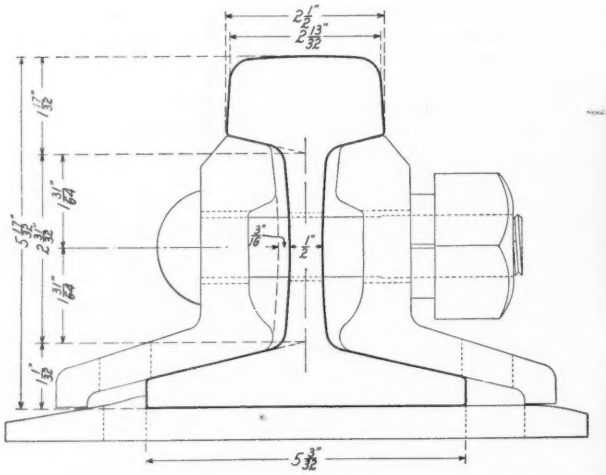
SPECIAL RAIL INSPECTION

IN 1912 a special inspection service for rails supplementary to that previously employed was inaugurated by Robert W. Hunt & Company, Chicago, since which time it has been applied to over 4,500,000 tons of rails. While the ordinary inspection made by this and other testing companies is confined primarily to an examination of the finished rail, this special inspection provides for the stationing of additional inspectors throughout the mill where they can observe the important steps in the manufacture of rails. As this service has now been in effect for four years it is possible to give some idea of its merits and of the results it is accomplishing. The November Employees' Bulletin of Robert W. Hunt & Company contains an analysis of the statistics prepared by the rail committee of the American Railway Engineering Association for the year ending October 31, 1915, showing the number of failures reported from rails rolled under the special inspection as compared with those not subjected to it. This study shows that there were 19.6 failures reported per 100 track miles of rails rolled under this special inspection as compared with 26.4 failures

reported for those to which this inspection did not apply, or that the number of failures was 40 per cent less with rails subjected to the special inspection.

A NEW 90-LB. RAIL SECTION

THE Chicago & Northwestern has designed a new 90-lb. rail section for use in its 1917 rolling, which embodies a number of features of interest. Before designing this section careful consideration was given to the probable necessity for increasing the weight of rail in the future and the conclusion was reached that the 90-lb. and 100-lb. sections will be sufficiently heavy for the traffic of the Northwestern for many years. A new 100-lb. section was designed two years ago and has been used since that time with very satisfactory results. The new 90-lb. section has been designed for main line use with that section. While not the governing principle in the design of the new rail, advantage was taken of the opportunity to adapt it to the 100-lb. joint to enable the same angle bars to be used with both sections of rail. Also the same joints and intermediate tie plates may be



NEW C. & N. W. 90-LB. RAIL

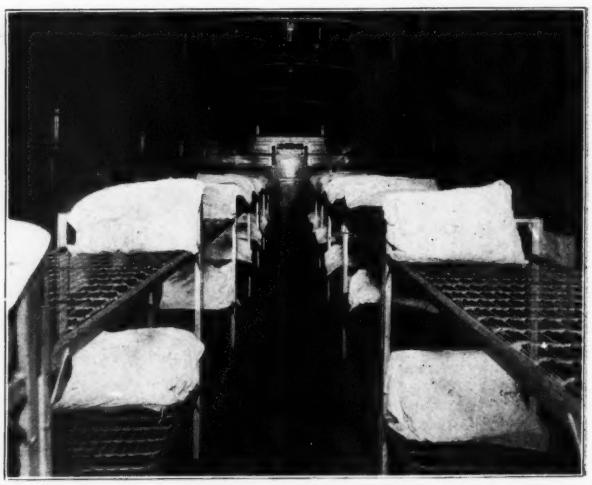
used for both the new 90 and 100-lb. sections, although the width of the base differs slightly. This uniformity of fastenings will not only prevent confusion, but will result in very material economies in the amount of material held in stock.

In designing the new section an endeavor was made to secure a sufficient fishing depth to enable a joint of the requisite strength to be used and also to secure a thicker base than previously employed. As a result the new section is a compromise between the American Railway Association, A and B sections. The rail has the same thickness of flange as the B section (1 1-32 in.), but has a fishing depth of 2 31-32 in. as compared with 3 5-32 in. for the A. R. A. type A section and 2 5/8 in. for the B section. As a result, the moment of inertia approaches that of the A section, being 36.72 as compared with 38.70 for the A section and 32.3 for the B section. To secure the desired distribution of metal, the head and the web are 1-16 in. narrower than the American Railway Association section. Thirty-eight per cent of the metal is in the head of this section, as compared with 36.2 per cent in the A section and 40.1 per cent in the B section. This rail has been designed under the direction of W. H. Finlay, chief engineer.

STEEL BUNKS FOR CARS AND TENTS

WITH the growing scarcity and increased cost of labor and the greater degree of attention given to secure the maximum efficiency of the labor output, railroads are giving increased attention to the comfortable housing of the men in construction or maintenance camps. One evidence of this has been the substitution of old passenger coaches and sleepers and canvas tents or bunk houses for the conventional bunk car. The accompanying photograph shows a passenger car in bunk car service in which sanitary steel bunks replace the boxed or wooden bunks commonly used. The bunks shown are double-deck angle bunks standing on four legs, independent of any support from the car structure. Other bunks may be had which are supported by chains and hooks from the sides of the car in one, two or three tiers. Instead of supporting them from the sides of the car, iron pipe standees secured to the floor and ceiling may be used.

One feature of this type of bunk is the provision for the easy removal by unhooking from the supporting chains. At the same time the bunks are secure against unhooking when in use. These bunks may be fitted with either wire fabric or canvas bottoms; the former are said to give the best results. These bunks are known as the



CAR EQUIPPED WITH ROMELINK BUNKS

Romelink bunks or berths, and are manufactured by the Southern-Rome Company, Baltimore, Md. They are said to be much cheaper than wooden bunks, while offering much less opportunity for the accumulation of filth and vermin. An installation of these bunks is in use on the Baltimore & Ohio.

A ONE-MAN RAILWAY.—A new use has been found for an abandoned railroad. The Idaho Southern Railway, built and in active service while the great irrigation projects of the Twin Falls country were under construction, was later abandoned by the owners. An enterprising Idaho man saw an opportunity, so he leased the track, ordered built for him a sixteen-passenger high-powered automobile, fitted with flange wheels, put it on the track with two light trailers for freight and express. He operates his auto train on a regular schedule and has the only one-man railroad in existence so far as known. The line extends from Jerome to Gooding and is reported to be doing a good business, considering the capacity of the equipment operated.

CREATING A FRIENDLY SPIRIT TOWARD THE ROADS

Two Discussions of the Opportunities for Section Foremen to Promote the Interests of Their Employers

IN their endeavor to cultivate favorable public opinion the railroads have generally overlooked the opportunities their section foremen possess to promote friendly relations with the residents of the smaller communities along the line. In many instances these men can be of material assistance to their employers in this campaign by handling efficiently those details of their work which bring them in contact with the public. Many of the railways have not realized the extent to which the occasional lack of attention to maintenance of highway and farm crossings, of drainage ditches and of fences has contributed to the general antagonism through the agricultural communities. For this reason the two articles following are published to emphasize the opportunities which the railways and the section foremen possess to remove this feeling.

THE RAILWAY AS A NEIGHBOR

BY TRACK MAN

The section foremen, from the nature of their duties, are the custodians of the railway right of way. They are, therefore, the representatives of the railways with whom the adjacent land owners, particularly in the agricultural communities, come most in contact and they are responsible more than any other group of employees for the sentiment which the farmers bear towards the railroads. The roads have been subjected to a large amount of adverse and restrictive legislation in recent years, particularly in the middle western agricultural states. This condition has resulted from a general feeling that a railroad is a foreign corporation without any interest in local conditions and from direct antagonism because of the multiplication of numerous instances of neglect and the assumption on the part of some roads of an attitude of indifference towards the local communities. More recently the roads have given a large amount of attention to means to overcome this feeling on the part of the public. They have not, however, in general realized the important place the section foremen hold in this campaign of education nor have the foremen themselves fully grasped the opportunity to further the interests of their employers by combating this spirit of antagonism on the part of those residents along the line with whom they come in contact in the course of their regular duties.

In many communities the section foreman and the agent are the only representatives of the company and the attitude of the railroad as seen by the citizens depends largely upon the relations which these men bear to the community. The agent comes in contact directly with the residents of the village and the patrons of the road, while the section foreman meets the adjacent property owners more directly and the road is popular largely to the extent that the dealings with these men is satisfactory. Each in his sphere can and does exert an important influence on the standing which the road which employs them enjoys in their respective communities. This does not mean that a foreman should leave other duties to undertake a campaign of education, for he now has all the work he can handle successfully. Rather the results desired will be secured by the proper performance of the duties coming within his regular activities.

As the owner of its right of way a railway becomes a neighbor with the adjacent owners of land and their tenants, with many of the relations this situation commonly presents. They have numerous interests in common, including the maintenance of fences, highway and farm crossings, drainage ditches, etc. While these have been the subject of legislation defining the duties and rights of each they cannot be settled satisfactorily entirely upon this basis. A railroad is required by law to maintain proper fences and to provide farm crossings under certain conditions for the use of the farmer. It is also prevented from interfering with the natural drainage of the land. There is, however, a wide difference between the maintenance of fences, for instance, in a manner which comes within the law and that which is commonly regarded as satisfactory. The indifferent manner in which this work may be handled may not result directly in damages to the road because of the fact that a farmer is not willing to incur the expense involved in a lawsuit, but it is no indication that he does not feel resentment and will not take the first opportunity to attack the road.

On the other hand, a farmer is frequently careless in the handling of gates at farm crossings, since the railroad is required to install and maintain them while he may make no effort to prevent stock from getting out on the track and being killed, the railroad paying for it. Likewise, during the harvest season some farmers make a practice of stacking their grain close to the fence, thereby increasing the fire hazard and the liability for claims later.

While all claims, or even all unfair ones, cannot be eliminated, many can and will be if the section foreman secures the confidence of the farmers along the right of way and impresses them with the desire of the railroad to be fair. Investigations will usually show that claims are most frequent on those lines where the farmers are most hostile to the railroads. When the average farmer realizes that the road is doing its full share to maintain the fences and to protect his stock, to keep the drains open, and the farm crossings in repair he will be far less desirous of taking every opportunity to file claims. It is in this way that attention to the proper maintenance of these facilities by the section foremen will promote friendly relations with the farmers and pay direct returns to the railroads.

There is also an indirect but nevertheless an important return from the traffic standpoint, particularly at competitive points. The farmers are producers of large quantities of live stock and grain which they are themselves shipping more generally each year and which they will naturally route over the road towards which they are most favorably inclined. Fair consideration of the rights of the farmers on the part of the section foremen is a very effective means of traffic solicitation under such conditions. A still further effect of a friendly attitude on the part of the farmers will be reflected in the nature of the demands made on the railroads by highway commissioners and other local authorities. There is almost continual contact between the railways and the public authorities which may become a source of considerable discord and difficulty if not properly handled. The value of a friendly board of highway or street commissioners is particularly evident when a railway has im-

provements in view for which it desires changes in grade or in the location of roads or similar improvements.

While the values which accrue to a railroad from the cultivation of friendly relations along the line are more or less intangible they are nevertheless real in the aggregate. The section foremen have an opportunity to perform a distinct service for their railroads while adding practically no additional duties on themselves. In fact, in many instances their duties will be lightened by the co-operation which they will secure from the farmers in maintaining fences, in driving stock off the right of way, etc., while the continued criticism and the necessity for explanation of complaints will largely disappear.

THE TRACK MAN AND THE PUBLIC

BY E. R. LEWIS
Assistant to General Manager, Duluth, South Shore & Atlantic

Public opinion, as it concerns railway companies, is molded to a great extent from the personal contact of individuals; from the experiences of patrons of the railway companies with their officers and employes, and from verbal and printed reports of the dealings of these individuals with each other on the business of patron and railway, of public and of corporation.

The importance, therefore, of the impressions made by the railways' representatives, on those persons with whom they come into contact, cannot be overestimated, but is too often unheeded or underestimated. Men of affairs have ever recognized the value of courtesy in all dealings with each other. Railway managements are by no means remiss in this particular, as is evidenced by instructions issued and placards displayed for the benefit of officers and employees.

The section foreman is selected to police the company's property. He is instructed to prevent trespass; to resist encroachments; to take charge of property found and stock killed or injured on the right of way; to preserve property posts, boundary fences and land line monuments; to keep waterways open and to be informed on all alterations to drainage proposed or carried out in the neighborhood of the company's property, which might affect the safety of the roadbed. The section foreman is charged with insisting that farm gates be kept closed. He is first appealed to for farm and highway crossings. He is asked for help to prevent and stop fires. He must cut the brush from about right-of-way fences and to fell or trim trees which endanger telegraph and telephone lines, and which may fall across tracks. He must set up snow fences, keep crossings clear of snow and ice, prevent persons from icing crossings for sleighs in winter, take care of fallen telegraph and telephone wires, and take responsibility for the maintenance of cattle guards, wing fences, signs and warning bells.

In all these duties and others, the section foreman comes into contact with the public, with those whose property adjoins that of the railway company, with owners and tenants, and lessors; with residents and tramps; with farmers, townsmen, tradesmen; with automobilists and teamsters; with truckers and pedestrians. These persons are the railway company's neighbors and patrons. They claim, one and all, the right to express their opinions, to voice their complaints, to make their claims, to argue their cases and to enforce their demands. They are naturally most likely to appeal first to the most accessible of the railway company's representatives. If satisfaction is not readily forthcoming, the company is blamed. Now, the section foremen is, or should be, one of the representatives most accessible to the public in these cases, and he must be prepared to rise to the occasion.

Railway men in the maintenance of way departments too often err in paying attention too strictly to their own particular line of work, to the exclusion of everything outside those limits. A section foreman frequently is, and should always be, a man among men in his community. He should make his influence felt when occasion arises. He should be as keen to get business and to preserve good will for his company as are the general manager, the freight and passenger traffic managers, agents or others who represent the company. The section foreman can do a great deal for his employers along these lines. He is often in court as a witness and as a juryman. He is often a householder and a taxpayer, nearly always a voter, frequently a highway commissioner or member of a school board.

Though the responsibilities of his position are heavy and his hours of service long, yet the section foreman may and should be a leader among men in his community. His opportunities to make his influence felt among his neighbors for the company's good and his own are plainly many. The danger is that the section foreman himself may not realize, and so neglect, to take advantage of his opportunities in this extended sphere of influence. Railway companies need worthy, hard-headed representatives in every department and community. Their influence should be felt throughout the land in favor of their companies, on all questions of the day, for of such is the kingdom of earth.

It is therefore the duty of the roadmasters, the supervisors and their assistants, to bring section foremen to a lively realization of their influence for the public weal and for the increase of their companies' business. The section foreman should know the residents along his section. The roadmaster should know the owners and tenants of property adjoining the railway. Requests, however seemingly absurd, from patrons of the company should receive respectful and prompt acknowledgment and attention.

The company's interests demand that every officer and employee shall give his best efforts toward getting and keeping business. The business of a railway company is the sale of transportation. Section foremen often hear of people wanting information on freight and passenger routing and rates. It is easy to recommend their own company's route and to put the inquirer into communication with the proper officer to supply the details and place the business. Foremen can do much to prevent claims for damage and to minimize those which cannot be prevented. Many claims are presented as the result of inattention. Many large claims are paid through the courts which might have been settled as very small items if promptly handled. Delay is annoying to the average railway patron, and delay has more to do with that dissatisfaction which has placed railways in disfavor than any other one factor. If a foreman or roadmaster can expedite settlement of any question opened by his company's patrons, he will be doing a service to the whole railway world.

The maintenance department should be organized not only as a machine to care for track, but as a body of men capable of leading men in any public enterprise, of influencing the public to understand and insist on fair dealings with and for railway companies. The leaders of these trackmen are the roadmasters. To them we must look for the necessary leadership.

A CHECK ON RECKLESS DRIVING.—To check the speed of automobiles before passing grade crossings, the city of Los Angeles has installed "humps" in the pavement on each side of the tracks for a short distance.

GENERAL NEWS DEPARTMENT

THE GRAND TRUNK has accepted an award, made by the governmental Board of Conciliation, increasing the pay of track repair laborers 25 cents a day, and advancing the pay of track foremen 20 cents a day.

THE INTERSTATE PASSENGER BUSINESS of the Atchison, Topeka & Santa Fe in the state of Kansas, according to the figures submitted to the Kansas Public Utilities Commission, yields a return of only 1.489 per cent.

THE PENNSYLVANIA RAILROAD has spent over $40,000,000 for the removal of grade crossings on the lines east of Pittsburgh since 1902. While a large number of crossings have been eliminated a much larger number still remain.

THE UNITED STATES STEEL CORPORATION and other steel companies have announced a further increase of $5 per ton in the price of rails. This makes the price of open-hearth rails $40 a ton and Bessemer rails $38, an increase of $10 per ton since last spring.

THE SOUTHERN has painted "barber pole" signs at all of its crossing gates, in accordance with the standard recommended by the American Railway Association. The stripes are alternate black and white, eight inches wide, running at an angle of 45 deg.

THE UNITED STATES STEEL CORPORATION has announced an increase of 10 per cent in the wages of the employes of its steel and iron companies, effective December 15 next. The increase affects in all about 200,000 employes, and adds nearly $20,000,000 to the corporation's annual pay roll.

THE CHICAGO, MILWAUKEE & ST. PAUL placed in service its third electrified district, extending from Deer Lodge, Mont., to Alberton, a distance of 110 miles, on November 1. This road now has 336 miles of line under electric operation, extending from Harlowton, Mont., to Alberton, and will place the fourth and last district from Alberton to Avery, Idaho, in service about January 1.

THE PENNSYLVANIA RAILROAD reported that in the eight months ending September 1, 13 people lost their lives and 104 were injured at grade crossings on the system. Out of this number no less than 23 drivers of motor cars smashed their machines into the sides of trains that were actually part way over the crossings, causing 4 persons to be killed and 51 injured. Six motorcycles, 2 bicycles and 4 horse-drawn vehicles were similarly driven into the sides of trains.

THE AMERICAN RAILWAY ASSOCIATION statement of freight car surpluses and shortages for November 1 showed a net shortage of 108,010 cars, the largest since these figures have been compiled. This is an increase from a net shortage of 60,697 cars on September 30 and is in contrast with the conditions for the eight years preceding August, 1916, when there was a continuous net surplus except for one month in 1909, three months in 1912, one month in 1913 and the month of March, 1916.

MEXICAN railway employees are not allowed to strike as a body in Mexico, as a result of which, the men in the repair shops along the northeastern Mexican roads recently hit upon the idea of striking in small groups at a time until everybody was out. The chief grievance of the men, it is said, is that they were paid in paper notes. As this currency fluctuates greatly, the men insisted upon being paid in gold. Their demands were refused by the Carranza authorities and the strike ensued.

THE GRAND TRUNK will issue annual passes to employees having been 15 years in the service on January 1, 1917. If a man is married the pass will include his wife. Each pass will be good over either the Eastern Ontario or Western lines, according to the territory on which the man is employed. Employees having been 20 years in the service will receive annual passes for themselves and wives, good over the entire system. Former employees now on the pension or superannuation rolls will be considered, with reference to length of service, as employees and will be accorded the same pass privileges.

THE CHICAGO, MILWAUKEE & ST. PAUL ROADMASTERS' ASSOCIATION held its tenth annual meeting at the Republican House, Milwaukee, Wis., on November 1 to 3, inclusive, with about 30 roadmasters present. Reports were presented on The Oiling of Track Appliances to Prevent Corrosion and the Causes of Our Present Labor Conditions and the Remedies. A. M. Anderson, roadmaster at Milwaukee, Wis., presided. The officers selected for the next year were R. Whitty, president, Horicon, Wis.; Dave Mau, vice-president, Chicago, Ill.; W. H. Kofmehl, secretary-treasurer, Elgin, Ill. Milwaukee was selected as the location for the next meeting.

THE LEHIGH VALLEY has stationed a complete emergency train at Easton, Pa., to house and feed workmen at out-of-the-way places on occasions of important repairs or serious troubles due to washouts, etc. The company bought two sleeping cars from the Pullman Company and fitted up two coaches as additional bunk cars, while another car was stripped of seats and a metal trough placed along either side at waist height for convenience in washing. Two additional coaches have been equipped with longitudinal tables and two rows of seats for use as a dining car. Between them is the kitchen car, made over from an old dining car. This kitchen car is equipped with an additional range, steam-tables and a refrigerator.

WILLIAM C. EDES, chairman of the Alaskan Engineering Commission, reports that much progress has been made on the construction of the government railroad. Forty-nine miles of track have been laid from Anchorage, which, with the 71 miles of the old Alaskan Northern now in operation as far as Kern Creek, makes 130 miles of the 470 needed to connect Seward with Fairbanks. The tracks so far laid from Anchorage comprise about 6 miles southward toward Seward, 38 miles of main line northward to Fairbanks and 15 miles on the Matanuska branch and into the coal fields near by. Rail will be laid in the near future as far as Potter Creek, 15 miles from Anchorage, from which point the rock excavation work will be undertaken during the coming winter.

PRESIDENT WILSON has prepared a preliminary draft of his message to Congress, in which he recommends legislation along the lines proposed at the time the Adamson law was passed, but upon which no action was taken at that time. The measures advocated include provision for the enlargement and administrative reorganization of the Interstate Commerce Commission, explicit approval by Congress of the consideration by the Interstate Commerce Commission of an increase in freight rates to counterbalance additional expenditures by the railroads because of the eight-hour law, a compulsory arbitration measure, and a law providing for the government use of the railways in times of military necessity. Needless to say, organized labor is bitterly opposed to the contemplated compulsory arbitration measure, and at a meeting held in Baltimore by leaders of the American Federation of Labor and the four railroad brotherhoods a frenzied demonstration followed a most radical speech by Samuel Gompers, who denounced the proposed legislation bitterly.

THE WEST VIRGINIA SUPREME COURT has held that when, by agreement with the adjoining land owner and for adequate consideration, a railroad rightfully turned the course of a stream, and in the absence of a contract to do so, the railroad is not liable, therefore, to observe the action of the water and to protect the banks or take other timely measures to prevent its encroachment on the adjoining land. It is the owners duty to protect his property and if he suffers damage by erosion he cannot recover from the railroad. The bridge originally built by the railroad over such a water course had decayed or been washed away by high waters, and because of the owner's negligence in failing to protect the bank on his land, the channel of the stream had been greatly deepened and widened. It was held that the whole burden of rebuilding the bridge and approaches thereto would not be enjoined on the railroad, but it might be required to build and maintain the crossing and bridge as if the conditions were the same as when it built the original crossing and bridge over the water course and right of way.

PERSONAL MENTION

GENERAL

M. C. SELDON, division engineer of the Chesapeake & Ohio at Richmond, Va., has been appointed trainmaster of the Rivanna district at Charlottesville, Va.

JAMES E. TURK, general superintendent and formerly supervisor of track and division engineer of the Philadelphia & Reading, has been appointed assistant to the general manager.

E. F. ROBINSON, chief engineer of the Buffalo, Rochester & Pittsburgh, has been promoted to the position of general manager, with headquarters at Rochester, N. Y. He will continue to administer the duties of chief engineer. Mr. Robinson was born at Earlington, Ky., on March 16, 1874, and graduated from Rose Polytechnic Institute, Terre Haute, Ind., in 1894. He entered railway work as a masonry inspector with the Cleveland, Cincinnati, Chicago & St. Louis at Mattoon, Ill., in December, 1895. He was appointed assistant roadmaster of the New York Central & Hudson River at Lyons, N. Y., on October, 1898, and became roadmaster on Chicago, St. Paul, Minneapolis & Omaha at Worthington, Minn., on September, 1899, which position he held until his appointment as superintendent of maintenance of the Butte, Anaconda & Pacific at Anaconda, Mont., on October, 1901. One year later he became engineer of track of the Buffalo, Rochester & Pittsburgh, with office in New York. He was appointed chief engineer in November, 1907.

ENGINEERING

R. G. WYMAN has been appointed division engineer of the Atchison, Topeka & Santa Fe, eastern lines, with office at Amarillo, Tex., succeeding J. W. Walter.

CHARLES A. LEMMON, chief engineer of the Butte, Anaconda & Pacific, has resigned to become assistant to the general manager of the Anaconda Copper Mining Company, Anaconda, Mont.

A. LECKIE, assistant engineer of the Arkansas Western, with headquarters at Pittsburg, Kan., has been appointed division engineer of the Kansas City Southern, with headquarters at Kansas City, Mo. He succeeds E. M. Basye, assigned to other duties.

E. G. LANG has been appointed division engineer of the Missouri, Kansas & Texas, with headquarters at Oklahoma City, succeeding G. H. Cravens, resigned to engage in private engineering practice. Mr. Lang was formerly roadmaster at Parsons, Kan.

W. C. PEARCE has been appointed division engineer of the Chesapeake & Ohio with headquarters at Richmond, Va., succeeding M. C. Seldon. F. D. Beale has been appointed acting division engineer at Clifton Forge, Va. J. W. Gleason has been appointed acting division engineer at Ashland, Ky., and H. A. Bertram has been appointed acting division engineer at Peru, Ind.

H. H. JOHNTZ, office engineer in the maintenance of way department of the Missouri, Kansas & Texas, has been appointed assistant engineer on general maintenance and construction work, with headquarters at Parsons, Kan. W. P. Christie, formerly assistant engineer with the Union Pacific at Castle Rock, Utah, has also been appointed assistant engineer in the office of the engineer maintenance of way at Parsons, Kan. L. E. Willis, transitman, has been promoted to the position of assistant engineer in the same office.

WILLIAM H. VANCE was appointed chief engineer of the Louisiana & Arkansas, with headquarters at Stamps, Ark., on November 1. He was born at Effingham, Ill., on November 6, 1876, and graduated from the University of Illinois in 1899. On March 1, 1902, he entered railway service with the Peoria & Eastern as assistant engineer, remaining in that position until March, 1905, when he was appointed assistant division engineer of the Missouri division of the St. Louis, Iron Mountain & Southern. He went to the Louisiana & Arkansas on June 1, 1906, as division engineer, remaining in that position until October 20, 1909, when he was appointed engineer maintenance of way, which position he held until his recent promotion.

J. S. MCBRIDE, recently promoted from valuation engineer to principal assistant engineer of the Chicago & Eastern Illinois, with office at Chicago, Ill., was born at Louisville, Ky., and graduated from the Rose Polytechnic Institute, in civil engineering. In 1905, he entered railway service with the Chicago & Eastern Illinois as instrument man on construction and maintenance, since which time he has been continuously in the employ of that road. In 1908, he was appointed assistant engineer of the Illinois division at Salem, Ill., and in 1914, was promoted to valuation engineer at Chicago, Ill. As principal assistant engineer, he will continue to have charge of the federal valuation work in addition to taking care of his new duties.

WILLIAM A. DUFF, the announcement of whose appointment as assistant chief engineer of the Canadian Government Railways, with headquarters at Moncton, N. B., was made in the last issue, was born at Hamilton, Ont., on April 20, 1877. He graduated from the University of Toronto in 1901, entering railway service the same year as draftsman and acting resident engineer of construction on the Vancouver, Victoria & Eastern, in British Columbia. In 1902 he was appointed assistant engineer on the Grand Trunk at Hamilton, Ont., and the following year went to the Kenwood Bridge Company, Chicago, Ill., as draftsman. He remained with this company until 1905, when he went in the same capacity to the Canadian Bridge Company at Walkerville, Ont. During 1907 and 1908 he was chief draftsman in the bridge department of the Transcontinental Railway at Ottawa, Ont., being promoted to assistant engineer of the same road, which position he held until 1913, when he was appointed engineer of bridges of the Canadian Government Railways at Moncton, N. B. He held this latter position when appointed assistant chief engineer as noted above.

WILLIAM A. DUFF

GEORGE W. CORRIGAN, roadmaster of the Southern Pacific at Hornbrook, Cal., has been appointed division engineer of the Stockton division, with office at Stockton, Cal. He was born at Harrisonville, Mo., in September, 1876. He graduated from the engineering department of the Missouri University at Columbia, Mo., in 1900, and immediately entered railway service with the Union Pacific as a rodman, later becoming an instrumentman on location and construction. From January, 1901, to November, 1907, he was employed by the Missouri Pacific, first as assistant engineer and then as division engineer, engaged chiefly on location and construction. From May, 1908, to March, 1911, he was assistant engineer maintenance of way on the Southern Pacific, and from March, 1911, to September 15, 1916, roadmaster with this same company. He succeeded L. Beauman, resigned.

ELMER H. BROWN, roadmaster of the Northern Pacific at Dilworth, Minn., has been appointed supervisor of bridges and buildings, with office at Minneapolis, Minn., effective November 1. He was born at Buffalo, N. D., on November 25, 1886. Upon graduating from Olivet College, Olivet, Mich., he entered the United States Reclamation Service, and the following year, 1909, took employment with the Northern Pacific in the construction department. During 1911 and 1912 he was assistant engineer in the valuation division of this same company, and was then appointed assistant engineer in the maintenance of way department, which connection he held until 1914. At that time he was made roadmaster at Dilworth, Minn., and now becomes supervisor of bridges and buildings, succeeding Dennison Fairchild, resigned to go into the contracting business.

R. B. BURTON, who has been senior assistant to John D. Isaacs, consulting engineer of the Southern Pacific, since February, 1912, has resigned, effective December 1, to accept a position with private interests. Mr. Burton has been in the service of the Southern Pacific since May, 1900, when he took a position as rodman on the western division of that road in the office of the resident engineer at Oakland Pier, Cal. In August, 1902, he was placed in charge of right-of-way and station ground leases and later became draftsman in the same office, where he remained until September, 1905, when he was transferred to the general office at San Francisco, where he was employed as a draftsman under the chief engineer. In November, 1906, he was transferred to the office of the consulting engineer of the Union Pacific and the Southern Pacific in Chicago and served as draftsman in this office until June, 1907, when he became chief clerk. In August, 1909, he became assistant to Mr. Isaacs and in February, 1912, when the Union Pacific and the Southern Pacific were separated, he was made senior assistant to the consulting engineer of the Southern Pacific.

R. B. BURTON

TRACK

DAVID PETERS, extra gang foreman on the Illinois Central, has been appointed supervisor, with office at Freeport, Ill., succeeding C. G. Byran.

FRED J. CHALLONER has been appointed roadmaster of the Northern Pacific, with office at Dilworth, Minn., succeeding Elmer H. Brown, promoted.

J. A. ROBERTS has been appointed supervisor of the Baltimore & Ohio, with headquarters at New Martinsville, W. Va., succeeding C. B. M. Long, transferred.

J. H. WINTERMEYER has been appointed supervisor on the Baltimore & Ohio, with headquarters at Wheeling, W. Va., succeeding T. C. Stonecipher, furloughed.

J. E. CONNOLLY has been appointed acting roadmaster of the Marysville district of the Southern Pacific, with headquarters at Marysville, Cal., succeeding B. O. Thistle, who has been appointed roadmaster of the Placerville district, with headquarters at Sacramento, Cal., vice F. L. Milne, assigned to other duties.

C. G. STEWART has been appointed assistant supervisor on the Chicago division of the Baltimore & Ohio, with headquarters at Walkerton, Ind. John K. Waite has been appointed assistant supervisor on the Illinois division, with headquarters at Vincennes, Ind. Wm. T. Haight has been appointed assistant supervisor of the Indiana division at North Vernon, Ind.

EGBERT I. ROGERS, assistant roadmaster of the Iowa division of the Illinois Central at Ft. Dodge, Ia., was appointed roadmaster, with the same headquarters, on November 1, succeeding H. Gileas, retired. He was born August 3, 1876, at St. Joseph, Mo., where he received his early education in the common schools. Later he entered the engineering department of the Missouri State University at Columbia, Mo., from which he graduated in June, 1897. He entered railway service with the Illinois Central the following month as a track apprentice. From January, 1898, to July, 1901, he was instrument man and assistant engineer in charge of surveys and new construction in the Mississippi delta, after which he was engaged in construction work until September, 1911, including double tracking and grade reduction in Mississippi, Louisiana, Kentucky, Tennessee and Illinois and new freight terminals at New Orleans, La. From September, 1911, to June, 1912, he was roadmaster of the New Orleans division of the Yazoo & Mississippi Valley, with headquarters at Vicksburg, Miss. During June and July, 1912, he was a special engineer on the Missouri, Oklahoma & Gulf, in Oklahoma. From July, 1912, to July, 1914, he was chief engineer of the Lorimer & Gallagher Construction Company on construction work in connection with the Southern Traction Company at East St. Louis, Ill., and from July, 1914, to July, 1915, he was engaged in private work in Kentucky and Texas. In August, 1915, he was appointed chief engineer of the Texas City Terminals at Texas City, Tex., which connection he held until February, 1916, when he was made assistant engineer in the valuation department of the Illinois Central. In August of the present year he was made assistant roadmaster at Ft. Dodge, Ia.

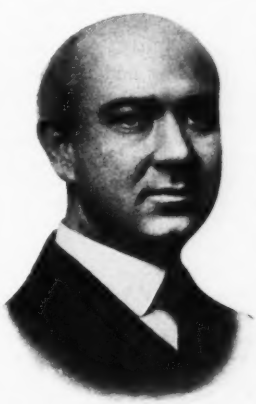
JAMES EDWARD CROWLEY, the announcement of whose promotion from assistant roadmaster to roadmaster on the Michigan Central, with office at Grayling, Mich., was announced in the last issue, was born August 18, 1873, at Leslie, Mich. He received a common school education in this community and then entered the Leslie high school, from which he graduated in April, 1889. He took employment immediately with the Michigan Central as a section hand, and several years later was promoted to a foremanship. During 1902 and 1903 he was foreman of the Saginaw yards for this same company, and was granted an indefinite leave of absence about this time to enter the employ of a contracting concern then building a new electric line between Saginaw, Mich., and Flint as superintendent of construction. In 1906 he returned to the Michigan Central as a section foreman, and in June, 1907, was promoted to extra gang foreman on the Mackinaw division. On October 1, 1907, he was appointed assistant roadmaster, which position he held until his present appointment became effective on September 1, 1916.

JAMES EDWARD CROWLEY

BRIDGE

E. H. BROWN, roadmaster of the Northern Pacific, at Dilworth, Minn., has been appointed supervisor of bridges and buildings, with office at Minneapolis, Minn., effective November 1, 1916.

MELVILLE FISK CLEMENTS, assistant engineer on the Northern Pacific, has been appointed bridge engineer, effective November 6, with office at St. Paul, Minn., succeeding H. E. Stevens, promoted to the position of chief engineer, as announced in the last issue. He was born in March, 1875, at What Cheer, Iowa, and graduated from the state university at Iowa City, Iowa, in 1899. The same year he entered railway service in the engineering department of the Burlington, Cedar Rapids & Northern. From June, 1902, to May, 1906, he held various engineering positions with the Chicago, Rock Island & Pacific, and from the latter date to August, 1907, he was engineer for the Clinton Bridge & Iron Works at Clinton, Iowa. In August, 1907, he was appointed assistant engineer on the Northern Pacific, since which time he has been engaged chiefly on new construction and grade separation. During the last two years he has been in charge of grade separation work at Spokane.



MELVILLE FISK CLEMENTS

H. H. FREEDLE, division bridge foreman on the Kansas City division of the Missouri, Kansas & Texas, has been appointed concrete inspector in the office of the engineer maintenance of way of the Missouri, Kansas & Texas, with headquarters at Parsons, Kan., with particular jurisdiction at present over concrete work on the St. Louis division.

PURCHASING

C. D. CLAPP has been appointed purchasing agent of the Mississippi Central, with headquarters at Hattiesburgh, Miss.

P. J. SHEA has been appointed general storekeeper of the Boston & Albany, with headquarters at West Springfield, Mass., succeeding E. B. Rockwood, resigned.

J. P. HARRISON, assistant purchasing agent of the Louisville & Nashville, at Louisville, Ky., has been appointed purchasing agent, succeeding P. P. Huston, retired. H. T. Shanks has been appointed assistant purchasing agent.

M. E. TOWNER, special representative of the Whitman & Barnes Manufacturing Company at St. Louis, Mo., has been appointed purchasing agent of the Western Maryland, with office at Baltimore, Md., succeeding H. M. Burgan.

GEORGE W. HAYDEN, assistant to the chief purchasing officer of the St. Louis—San Francisco, with office at St. Louis, Mo., has resigned to accept employment with the New York, New Haven & Hartford as supervisor of materials and supplies, with headquarters at New Haven, Conn.

OBITUARY

CHARLES W. HOTCHKISS, chairman of the board of directors of the Virginian Railway and president of the Chicago Tunnel Company and the Rail Joint Company, died at Battle Creek, Mich., on October 28, of organic heart trouble. He was born at Unadilla Forks, N. Y., on June 19, 1863. He entered railway service with the New York, West Shore & Buffalo at Newburgh, N. Y., as a rodman. He was assistant engineer on the Michigan Central from August, 1886, until May, 1896, from which date he was chief engineer of the Chicago Junction to January, 1899. On this date he was appointed chief engineer of the Chicago Transfer and Clearing Company and in June, 1900, he was elected president of the Indiana Harbor Railroad and built the Indiana Harbor Belt and the Chicago, Indiana & Southern. When the New York Central took over these lines in October, 1905, he was made general manager of the Chicago, Indiana & Southern. In May, 1912, he was elected president of the Chicago Tunnel Company, Chicago, Ill., In February, 1915, he was also elected to the chairmanship of the executive committee of the Virginian Railway and president of the Rail Joint Company of America.

CHARLES W. HOTCHKISS

CIGARETTE SMOKING.—On the Texas & Pacific a rule has been promulgated prohibiting the smoking of cigarettes by employees on duty.

HEROISM.—Jerry Fountain, crossing watchman on the Alabama Great Southern, Bessemer, Ala., has been awarded a Carnegie medal for heroism in rescuing an aged pedestrian from being killed by a freight train on the afternoon of May 1 last. Watchman Fountain, who has but one arm, succeeded in pulling the old man from the track but not before the engine had struck them both. He was badly bruised, but the wayfarer, 94 years old, was not injured.

CONSTRUCTION NEWS

THE ALABAMA GREAT SOUTHERN plans to construct at once a new freight station at Bessemer, Ala. The building will be of reinforced concrete and brick, 33 ft. by 205 ft., having a platform 350 ft. long served by the necessary tracks.

THE ATCHISON, TOPEKA & SANTA FE is considering plans for an entrance into St. Louis. A cut-off from some point on its line near Carrollton, Mo., to Mexico, Mo., on the Chicago, Burlington & Quincy is proposed, using the tracks of the Burlington from that point to St. Louis. This line will also give the Burlington a new short line to Kansas City.

This road also plans to construct a new line from Caney, Kan., through Pawhuski, Okla., to Ralston, a distance of about 60 miles. Although surveys are being made, no actual construction will be started until the details in connection with the securing of the right of way are completed.

THE BALTIMORE & OHIO has started improvement work with company forces at the Garrett, Ind., freight yards on its Chicago line, which will cost approximately $75,000. The yards are being enlarged to increase the capacity of eight tracks in the westbound yard and four tracks in the eastbound yard to 100 cars each.

This road has also let contracts and work is in progress on construction of double track from Milford, Ind., to La Paz, a distance of 24 miles. This work will include 7 new steel bridges with concrete substructures. On the completion of this work this system will have double track from Philadelphia to Chicago.

THE CANADIAN NORTHERN plans to extend its line from Easton, Alta., Can., to a point about 35 miles west, though as yet no contracts have been awarded and work has not been started.

THE CENTRAL RAILROAD OF NEW JERSEY has awarded a contract to F. D. Hyde, New York, to build a new passenger station at Newark, N. J. The building will be 45 ft. high and 60 ft. wide in front and 266 ft. in the rear, the length varying from 86 ft. to 400 ft. The structure will have concrete foundations, steel frame, brick and terra cotta walls and a wooden and concrete roof, with built-up roofing. The building proper will cost $500,000 and the track changes $50,000 additional.

THE ILLINOIS CENTRAL has awarded a contract to A. W. Stoolman, Champaign, Ill., for the erection of a new passenger station at Mattoon, Ill. The building will be two stories high, 160 ft. long and 36 ft. wide, and will cost approximately $75,000.

THE KANSAS CITY TERMINAL has awarded a contract to the Arkansas Bridge Company of Kansas City, Mo., for the erection of a steel bridge over the Kaw river and actual construction has just commenced. The bridge will require about 25,000 tons of steel and will cost approximately $3,000,000. There will be two 300-ft. and one 135-ft. spans over the Kaw river and one 117-ft. and one 147-ft. span over various railway tracks. There will also be girder viaduct approaches totaling 7,700 lineal feet.

THE MICHIGAN CENTRAL and the Michigan State Highways Commission have asked for bids on or about January 1 for the construction of a reinforced concrete bridge 620 ft. long in Ann Arbor, Mich. The estimated cost is about $45,000.

THE MISSOURI, KANSAS & TEXAS will erect a new passenger station at San Antonio, Tex., which will be one story high, 245 ft. long and 77 ft. wide. The structure will be fireproof throughout with stucco on brick, built in the mission style with mission towers, and will cost approximately $125,000. The platforms along the passenger tracks will be 850 ft. in length and covered with umbrella sheds.

THE MISSOURI PACIFIC intends to begin work in the early spring on the elevation of its tracks at Dodge, Douglas and Farnam Streets, Omaha, Neb. For this purpose Judge Hook of the Federal Court at St. Louis, Mo., has authorized B. F. Bush, receiver, to expend $200,000. It is the intention ultimately to elevate the Belt Line tracks for a considerable distance beyond the point mentioned, but at present only the work outlined above will be undertaken.

THE NORTH TEXAS & SANTA FE contemplates building a line from Hannaford, Tex., to Shattuck, Okla., a distance of about

85 miles. Surveys have been completed and the final details in securing the right of way are being completed. About one-half of the construction will be through a fairly level prairie country, while the other half will offer heavy work. Engineering headquarters have been established at Shattuck, Okla., and much material for the undertaking has already been delivered at that point. It is understood that the Atchison, Topeka & Santa Fe will assume control of this road on its completion.

THE PENNSYLVANIA RAILROAD has awarded a contract to H. L. Kreusler, Pittsburgh, Pa., to build a 40-ft. extension to the single-story combined freight warehouse and office building at Greensburg, Pa. The extension will have a concrete foundation, will be of brick construction with slate roof and will cost about $50,000.

This road also plans to build an outbound freight house 30 ft. wide and 240 ft. long at Rochester, N. Y., at an approximate cost of $50,000. The present freight house will be used as an inbound receiving station and additional tracks to hold 40 cars will be constructed between the two stations.

It has also authorized work at its West Morrisville, Pa., yards, on the New York division, which consists of the construction of an eastbound receiving and a westbound departure yard and an eastbound and westbound main running track. The work involves from 350,000 to 400,000 cu. yd. of grading, the construction of 3,000 cu. yd. of concrete masonry and about 2,500 sq. yd. of macadam paving.

THE SOUTHERN has completed plans for the enlargement of its yard at Pomona, east of Greensboro, N. C., which consist of the extension of the present yard tracks, and the addition of 13 new yard tracks and 3 repair tracks. The yard proper will have a capacity of 1,084 cars and the repair tracks 104 cars, a total of 1,188 cars which is an increase of 829 cars over the present facilities. A new engine terminal will also be built at Pomona Junction, with a modern 18-stall roundhouse, a 100-ft. turntable, a mechanical coaling station, machine shop and auxiliary buildings. Bids for the construction and heating of the roundhouse have been asked for.

STRUCTURAL STEEL

THE CHICAGO, BURLINGTON & QUINCY has ordered 3,000 tons of structural steel from the American Bridge Company for a freight house at Chicago, to be built in connection with the Chicago passenger terminal improvements.

THE DELAWARE & HUDSON has ordered 400 tons of bridge work from the Phoenix Bridge Company.

THE GREAT NORTHERN has ordered 305 tons of steel from the Minneapolis Steel & Machinery Company for an extension to its mail and express building at Minneapolis.

THE KANSAS CITY TERMINAL has given an order to the American Bridge Company to fabricate 25,000 tons of structural steel for a bridge over the Kaw river and approaches at Kansas City, Mo.

THE NEW YORK & LONG BRANCH has ordered 1,000 tons of steel from the McClintic-Marshall Company for a bridge over the Manasquan river.

THE PENNSYLVANIA RAILROAD has ordered 1,000 tons of bridge steel from the McClintic-Marshall Company.

THE SOUTHERN has ordered 500 tons of steel from the Virginia Bridge & Iron Works for car repair shops at Spencer, N. C.

TRACK MATERIALS

THE ANN ARBOR is reported to have ordered 1,500 tons of rails from the Illinois Steel Company.

THE CHICAGO, BURLINGTON & QUINCY has ordered 25,000 tons of rails for 1917 delivery from the Illinois Steel Company.

THE FRENCH GOVERNMENT is reported as having ordered 50,000 tons of rails from the Bethlehem Steel Corporation.

THE GREAT NORTHERN has ordered 30,000 tons of rails with fastenings from the Illinois Steel Company for 1918 delivery.

THE RUSSIAN GOVERNMENT is reported having ordered 50,000 tons of rails from the Bethlehem Steel Corporation for the Trans-Siberian Railway.

THE ST. LOUIS-SAN FRANCISCO will purchase 56,000 tons of rails.

SUPPLY TRADE NEWS

PERSONAL

EXUM M. HASS, western editorial representative of the Electric Railway Journal, has been appointed manager of sales of the International Steel Tie Company, Cleveland, Ohio, effective on November 1. He graduated in civil engineering from Purdue University, 1905. Previous to his college course and during vacations he served in the engineering corps of the Baltimore & Ohio and the Chesapeake & Ohio. After graduation he was made resident engineer for the Chicago & Eastern Illinois in the construction of a freight yard at Dalton, Ill. In 1906 he was appointed assistant engineer maintenance of way of the Illinois Traction System, where he helped organize a maintenance of way department. In 1907 he was appointed locating and constructing engineer for the company, in charge of building extensions to the system. In 1909, when work on the track extensions had practically ceased, his title was changed to superintendent of bridges and buildings, and while serving in this capacity most of this company's standard way stations and sub-stations, as well as the terminal buildings in St. Louis, Mo., were built. In November, 1912, he joined the editorial staff of the Electric Railway Journal and has since served as western editorial representative.

EXUM M. HASS.

D. P. LAMEROUX has been appointed general manager of the Pratt & Letchworth Company, Ltd., Brantford, Ont. He was born in Mayville, Wis., December 12, 1873, and took a course in civil engineering at the University of Wisconsin, in the class of 1895. After leaving college he spent two years in the maintenance of way departments of the Milwaukee Northern and the California-Oregon and the following three years as private secretary to the commissioner of the general land office at Washington, D. C. In 1900 he became associated with the Beaver Dam Malleable Iron Company, working his way up through that organization until he became general manager, and remaining with this concern until 1913. During this period he was also on the legislative committee of the Wisconsin Manufacturers' Association and for three years a regent of the University of Wisconsin. In this year he entered the railway supply business in Chicago, being connected with the Cleveland Steel Company and the Trumbull Steel Company. In his new duties he will act as general manager of the various malleable plants of the Canadian Car & Foundry Company, Ltd., including the Pratt & Letchworth Company's plant at Brantford and the malleable iron plant at Amherst.

D. P. LAMEROUX

ROBERT D. SINCLAIR, first vice-president of Mudge & Company, Chicago, has been elected vice-president in charge of all departments. He was born at Chicago, Ill., on April 12, 1878, and entered railway service in the auditing department of the Chicago & Eastern Illinois in 1892. The following year he accepted a position with the operating department of the Columbian Intramural Railway at the Chicago World's Fair. At the close of this exposition he entered the service of the Union National Bank of Chicago, and remained with it until its consolidation with the First National Bank in 1900. When he went with the larger bank, remaining until September 1, 1910, when he became secretary and treasurer of Mudge & Company. On June 9, 1912, he was elected second vice-president of this concern, later being made first vice-president. On November 1, 1916, he was elected vice-president in charge of the sales, manufacturing and operating departments of the company as noted before.

ROBERT D. SINCLAIR

EDWARD THOMAS HENDEE, secretary of Joseph T. Ryerson & Son, Chicago, died suddenly at Minneapolis, Minn., November 12, 1916. He was born at Claremont, N. H., on February 22, 1880, and graduated from the New York University in 1900. From 1901 to 1902 he was assistant professor of mechanical engineering at New York University, and on the latter date became associated with Joseph T. Ryerson & Son, as advertising manager. In this capacity he built up and became manager of the machinery department, and in this connection he was particularly successful in developing the domestic and foreign machinery business and the railway supply business of his company. In 1911 he was made assistant to the president and in 1913 was given charge of the railway supply department. In the same year he was elected secretary of Joseph T. Ryerson & Son, which position he held at the time of his death. Mr. Hendee was also vice-president and director of the Lennox Machine Company and director of the American-Glyco Metal Company.

EDWARD T. HENDEE

GENERAL

THE KIRBY LUMBER COMPANY, Houston, Tex., has announced that its sales will be handled exclusively by the Kirby-Bonner Lumber Company.

THE JONES & LAUGHLIN STEEL COMPANY, Pittsburgh, Pa., plans to establish a large warehouse in St. Paul, Minn., to handle its northwest business.

THE HESS-BRIGHT MANUFACTURING COMPANY makes the following announcement to correct misleading rumors and statements: "A group of bankers, including Frank A. Vanderlip, Philip W. Henry, Thatcher M. Brown and Franklin B. Kirkbride of New York and Marcus Wallenberg of Stockholm, have recently acquired from the American group of stockholders a controlling interest in the Hess-Bright Manufacturing Company. This group of bankers also owns a substantial interest in the S. K. F. Ball Bearing Company of Hartford, Conn. The two companies will be operated independently of each other. The former policy of the Hess-Bright Manufacturing Company will be increased somewhat more rapidly to meet the constantly-growing demand for its product. B. D. Gray, who retains his former stock holdings, will continue to manage the business as president. F. E. Bright retires from active participation in the company's affairs, but remains identified with the company as chairman of the board. Aside from these two changes, the organization remains as before.

TRADE PUBLICATIONS

POLE JACK.—Templeton, Kenly & Company, Ltd., Chicago, has issued an eight-page folder describing its new pole jack for pulling, straightening and reinforcing telegraph and other poles. The pamphlet is illustrated with photographs of this jack in service showing the numerous uses for which it is adapted.

A TEST FOR CREOSOTE OILS.—The Republic Creosoting Company, Indianapolis, Ind., has issued a folder describing the Davis spot test for the determination of the presence of tar, free carbon or dirt in creosote oil with colored illustrations of the results of these tests. This test was described in the *Railway Maintenance Engineer* for September, page 285.

"PECKY" CYPRESS.—The Southern Cypress Manufacturers' Association, New Orleans, La., has issued a small 44-page booklet describing "Pecky" Cypress, which contains a large amount of information regarding this peculiar timber, its development and its uses. This book is prepared in an unusually interesting manner and is well illustrated with photographs of this timber and its uses.

PAINT GUNS.—The Spray Engineering Company, Boston, Mass., has issued a bulletin describing its "Spraco" paint gun, a hand tool for use in applying all kinds of liquid coatings. The equipment is adapted for use in the shop or field and may be adjusted for spraying the highest grade of varnishes and lacquers, as well as heavy asphaltum and structural paints, producing finely finished surfaces without streaks or brush marks. It is also adapted to applying heavy durable coatings to rough structures.

CONCRETE THROUGH THE AGES.—The Pennsylvania Cement Company, New York, has issued a 28-page book with the subtitle, "Looking Backward Twenty Centuries on Concrete Construction." It is not a matter of general information that the first extensive use of concrete construction came during the early Roman period and that the Roman people carried it to an extraordinary development as early as in the first century B. C. The distinguishing feature of this book is a series of six color drawings showing the Pantheon at Rome, the Pont du Gard at Nimes, the Pons Fabricus, the Via Appia or Appian Way, the Amphitheater at Pompeii and an unnamed view of Roman ruins, in the first five of which concrete played an important part.

REINFORCED CONCRETE DESIGN.—The Portland Cement Association, Chicago, has published a 20-page pamphlet containing a lecture prepared by Earnest McCullough, chief engineer of the Fire Proof Construction Bureau of that association, for a short course for teachers held at Lewis Institute, Chicago, to expound the principles of reinforced concrete design with the fewest words and in the simplest possible form. The standard symbols are given and the usual formulæ are derived, introducing a number of diagrams designed to illustrate the principles of flexture, bond, shear, etc., to those not familiar with the subject. The pamphlet is limited in its scope to the simple column and beam with a section on the reinforcing of a circular tank.

THE CHANNEL TUNNEL.—It appears that the London press is favorable to the English Channel tunnel project. Late in August it was announced in Paris that France had taken all the necessary steps to enter into negotiations with England for the joint construction of the tunnel. Plans were outlined by M. Sartiaux, chief engineer of the Nord Railway Company, who stated that the tunnel would cost £16,000,000. It is stated that the English Tunnel Company controls the right to construct tubes.—Canadian Engineer.

REILLY IMPROVED CREOSOTE OIL

"Stays in the Wood"

A Creosote Oil that evaporates does not permanently preserve the timber.

Railroad Ties	Telegraph Poles
Cross Arms	Bridge Planking
Piling	Structural Timber

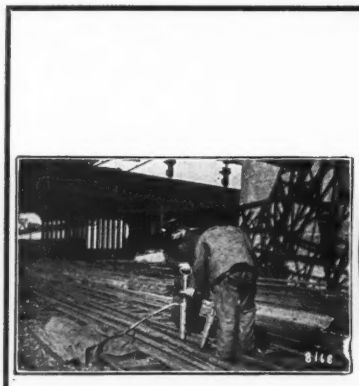
will never rot or decay if preserved with REILLY IMPROVED CREOSOTE OIL. It defies time and weather. Extremes of temperature have no effect on it. Alternate wetting and drying and water pressure are harmless to timber when REILLY IMPROVED CREOSOTE OIL is the preservative. It is fixed and stable; volatilization of this oil is reduced to a minimum. A single trial makes a permanent customer. An order for a barrel or a tank car of REILLY IMPROVED CREOSOTE OIL will receive prompt attention.

Creosoted wood products of every description is our specialty. We will serve you from our nearest plant.

REPUBLIC CREOSOTING COMPANY

INDIANAPOLIS, IND.

Plants: INDIANAPOLIS MOBILE MINNEAPOLIS SEATTLE



"IMPERIAL" TIE TAMPERS

Have established a new standard of efficiency in track ballast—They reduce both time and labor costs.
They work with equal effectiveness in any kind of ballast at a rate of progress unapproached by other means. Let us tell you what is being done by "Imperial" Tampers on many lines where conditions approximate your own. ASK FOR BULLETIN 9023

INGERSOLL-RAND COMPANY

30—TT

11 Broadway, New York Offices the World Over 165 Q. Victoria St., London

More than a mere Tie Plate—A safety device—An economic device—A device promoting easy riding Track. The

LUNDIE TIE PLATE

will more than pay for itself in saving of Rail and Wheel wear and in reduction of maintenance expense, as well as performing the usual functions of a Tie Plate.

JOHN LUNDIE, 52 Broadway, NEW YORK

We will pay 25 cents each for 10 copies of the January 1916, issue of Railway Engineering and Maintenance of Way. Those of our readers having copies of this issue for disposal will do us a favor by mailing us a card, advising that we may have them.

RAILWAY
MAINTENANCE ENGINEER
Transportation Building CHICAGO

Make This Test On Your Desk

YOU can satisfy yourself that Reeves Wood Preserver does its work quickly and completely by making a simple little test right on your desk. We'll send the testing outfit free upon request.

Just remove the cork; place the pine stick in the bottle of Reeves Wood Preserver; leave it there for three minutes (by your watch), then whittle the wood to make sure that the wood preserver actually penetrated to the center of the pine stick. This little practical demonstration shows that it is unnecessary to invest in expensive apparatus in order to protect your cross-ties and other railroad timber from decay.

Reeves Wood Preserver penetrates wood by natural absorption, just as water penetrates a sponge. The treating plant can be located right on the job, as the wood preserver is ready to use without heating, mixing or preparation in any way.

Reeves Wood Preserver does not corrode or destroy metal coming in contact with it and as the preservative is not soluble in water, the protection to the wood is permanent.

MAKE A TEST ON YOUR DESK BEFORE YOU PASS JUDGMENT. WRITE FOR THE FREE TESTING OUTFIT AND LITERATURE.

THE REEVES CO. - - - New Orleans, La.

Threads Protected But Not Filled-Up!

No Re-Cutting

LOHMANNIZED

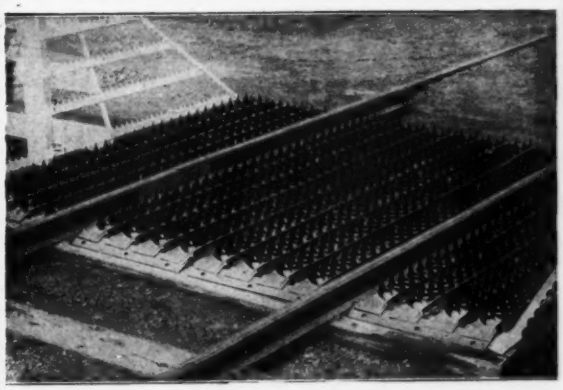
With Lead Alloy Coating

BOLTS and NUTS

Your Inquiries Requested

JOHNS & CO., Inc.

50 Church St., New York
Telephone 7230 Cortland



For Economic Efficiency Use

The NEW 1917 Model

National Steel Cattle Guard

The new 1917 National Cattle Guard is the most economically maintained cattle guard in use. Easily installed without previous experience or preparation. No parts to get out of order. Impervious to corrosion and all weather conditions. 87% of all steel is vertical—rain or salt water drippings can thus find no lodgings. The "NATIONAL" is not a flat piece of steel with struck up points but a MECHANICAL DEVICE—the only absolute protection against unruly stock.

New Illustrated Circular

Free Write for our new illustrated descriptive circular on the 1917 "NATIONAL" telling why the "NATIONAL" is being used by leading railroads. Write TODAY. **Free**

NATIONAL SURFACE GUARD CO.
209 So. La Salle Street, Chicago, Ill.

STOP

A MINUTE TO

LOOK

AT THIS COMPARISON AND

LISTEN

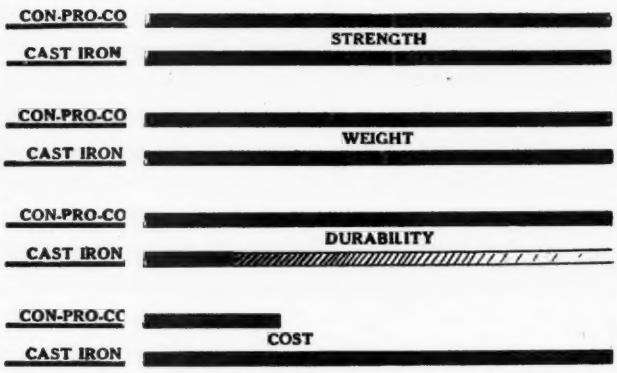
TO REASON

COMPARISON of

"Con-Pro-Co" Reinforced Concrete

AND

Cast Iron Culvert Pipe



SEND FOR OUR ROUND PIPE CATALOGUE

CONCRETE PRODUCTS CO. OF PITTSBURGH

DIAMOND BANK BUILDING—PITTSBURGH, PA.

C. F. MASSEY COMPANY

NEW YORK CHICAGO SPOKANE

Massey products are permanent, fireproof, economical, and require absolutely no maintenance. They are made in modern well equipped plants and of the best material procurable.

Information and prices on our piles, bridge slabs, cattle passes, culvert pipe and other products will be furnished interested parties on application.

The advantageous location of our factories enables us to ship to all points at a low freight rate and the large stock of standard products carried at each factory insures prompt deliveries.

Our factories are located as follows:

Newark, N. J.	Spokane, Wash.
Chicago, Ill.	Anna, Ill.
Minneapolis, Minn.	Memphis, Tenn.

Don't Let Your Double Crossings Double Cross You

Wooden tie crossing foundations mean continued trouble and expense in keeping the crossings to line and grade.

It is hard to support heavy service straight track on wooden ties spaced as closely together as possible.

It is still harder, if not impracticable, to have wooden ties support crossings, which have twice the service of straight track and with the ties actually spaced to poorer advantage than on straight track.

Double the life of your crossings and greatly decrease maintenance charges by using International Steel Foundations. These structures are box girders built up of channels and plates and filled with creosoted wood block to aid in transferring the loads from the top to the bottom plates.

They will never double cross you, and, what's more, they are not expensive and are easy to install.

Send us blue prints of your crossings and let us submit quotations for International Steel Crossing Foundations which will increase the life of your crossings two to three times. Shipment in three weeks.

The International Steel Tie Company

General Sales Office and Works, Cleveland, Ohio

REPRESENTATIVES:

Maurice Joy, Philadelphia

William H. Ziegler, Minneapolis

Western Eng'g Sales Co., San Francisco, Los Angeles, Seattle

R. J. Cooper Co., Salt Lake City

J. E. Lewis & Co., Dallas

An Example of

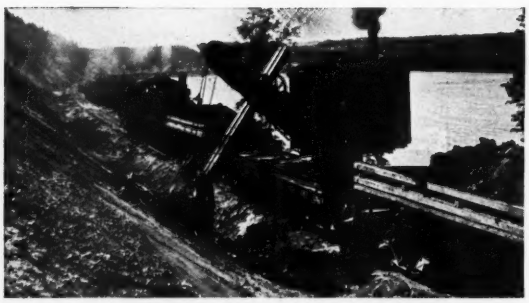
Western Air Dump Car Economy

A certain western road had been handling cinders in A-frame dump cars on local trams. The crew of the local would pick up a section gang to do the unloading, which would keep both train crew and section gang from 30 minutes to one hour. Now with Western air dump cars the train crew does it all instantly and without any additional help.

Let us give you full information regarding the **big** economies in Railroad Ditching and Trestle Filling work.

Western Wheeled Scraper Co.
AURORA, ILL.

Marion
Railroad Ditchers



Model 15 Marion Ditcher on Canadian Pacific Railway

Three Big Marion Advantages

FIRST: *Independent Boom Engines.* A Marion Ditcher is able to dig through a considerably wider range because of its independent boom (or crowding) engines, thereby saving time of moving back and forth along the bank. It is also able to dig much harder material for the same reason, because of the more positive action of the dipper handle.

SECOND: *Independent Swinging Engines.* A Marion Ditcher is better able to hold its position on curves while digging. The swinging motion is positive in either direction and is not controlled by frictions or similar devices.

THIRD: *A Marion Ditcher may be easily changed into a small revolving steam shovel for work on the ground.* A truck frame for railroad wheels or traction wheels can be substituted for the regular ditcher truck frame, and the ditcher becomes a revolving shovel, suited to a revolving shovel's wide range of work.

These three are only a few of the many points of Marion Ditcher Superiority. Marion Excavating Machinery is being used on hundreds of railroads in the United States and abroad, which is good evidence of its efficiency.

THE MARION STEAM SHOVEL COMPANY
Established 1884 MARION, OHIO
Atlanta Chicago New York San Francisco Seattle
Manufacturers of Excavating Machinery of Every Description

LIDGERWOOD HOISTS

Steam Electric Gasoline

A complete line of Contractors' Standard Hoists.

Illustration represents improved Bridge Erecting Engine with Six Independent Winch Heads.

Derricks Cableways
Rapid Unloaders
Excavators

Write for Catalogues.

Lidgerwood Mfg. Co.,
96 Liberty St., New York
Philadelphia
Pittsburgh
Chicago Seattle
London, Eng.

Speed
Strength
Capacity

EVERY DAY A BLASTING DAY
WHEN BLASTERS LOAD

DU PONT

Red Cross
Low Freezing Powder

Every contractor realizes the importance of using explosives insensitive to frost.

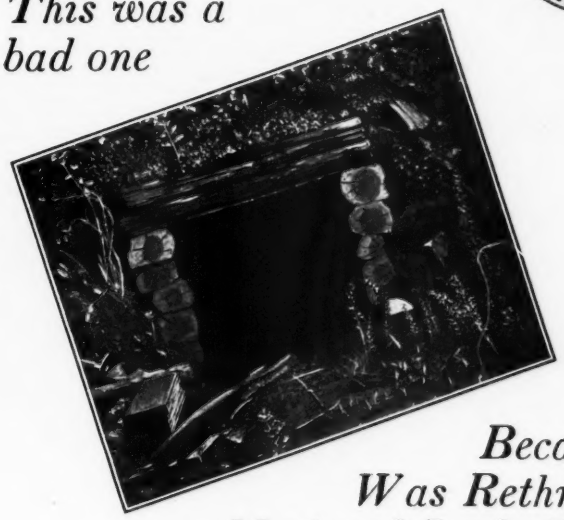
Red Cross Powders rarely freeze and can be loaded and fired with satisfactory results in cold weather.

Safeguard your blasting crew, minimize your contractors' risks and extend your outdoor working season by blasting with Red Cross Low Freezing Powders.

Tell us what your blasting work is and let our expert field men suggest economic and practical methods.

E. I. du Pont de Nemours & Co.
Powder Makers Since 1802
Wilmington Delaware

This was a bad one



Now it is a good one

Because It Was Rethreaded With National Lock-Joint Cast-Iron Pipe

Look These Facts In The Face
Before You Face Your Next Culvert Renewal Problem

How about your Culvert Renewal Expense for 1916?

Rather a good-sized item, was it not?

How about your Culvert Renewal Expense for 1917, 1918, etc., etc.? Looks as if that item in your annual maintenance budget was to be a source of annual regret, is that it?

Then hark! That heavy item is unnecessary, should be, **can be,** cut out; that is, reduced each year till it practically disappears. "Going! Going! Gone!" That's it exactly, "Now You See It and Now You Don't." Sounds like magic, but it is not. It is just sound engineering sense applied to culvert problems, and

National Lock-Joint Cast-Iron Pipe

installed for your culverts, that's all; but how it saves money in annual culvert renewals.

Right now, before you face your next culvert renewals, look these facts in the face.

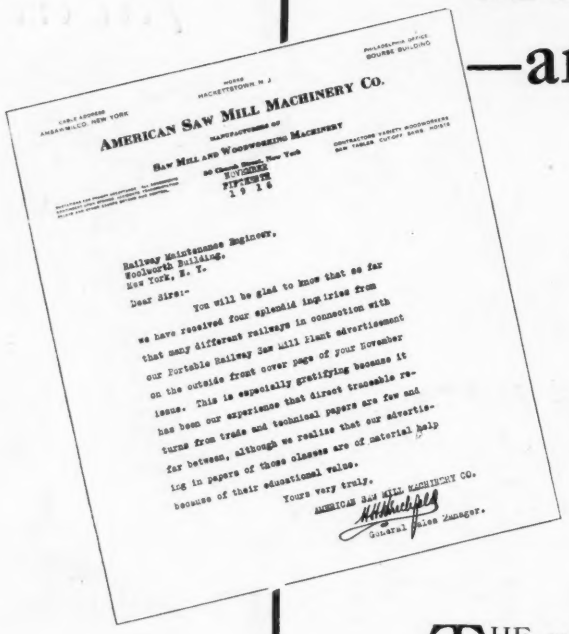
National Lock-Joint Cast-Iron Pipe, made from remelted Alabama Pig Iron, is as permanent as your roadbed. It comes in short lengths (3, 4 and 5 ft.) that means easy handling. Those little old section gangs of yours will install it without accessory of any kind and without interfering with traffic. Rethread the old culvert and back fill with cement—that's all; and, what is more, that's all you will hear from that culvert. See how the renewal expense vanishes, growing less each year.

And now, one last word. It is sold by the foot, first cost is low, before you know it you will have **no** Culvert Renewal Problem—"Going! Going! Gone!" The Renewal Expense, Not the Pipe. *Now you see it.*

CATALOGUE AND PRICES ON REQUEST.

AMERICAN CASTING CO.
Birmingham, Ala.
Chicago Office: - Peoples Gas Building
New England Representative
Fred A. Haudlette & Son - Boston, Mass.
St. Louis Representative
H. P. Webb - - Wainwright Building
St. Paul Office
Contractor's Supply and Equipment Co.

Here Is a Tip for Makers of Portable Saw Mills —and others



AMERICAN SAW MILL MACHINERY CO.

MANUFACTURERS OF

SAW MILL AND WOODWORKING MACHINERY

Railway Maintenance Engineer,
Woolworth Building,
New York, N. Y.

Dear Sirs:-

You will be glad to know that so far we have received four splendid inquiries from that many different railways in connection with our Portable Railway Saw Mill Plant advertisement on the outside front cover page of your November issue. This is especially gratifying because it has been our experience that direct traceable returns from trade and technical papers are few and far between, although we realize that our advertising in papers of those classes are of material help because of their educational value.

Yours very truly,

AMERICAN SAW MILL MACHINERY CO.

General Sales Manager.

This letter is evidence of the "pulling power" of the advertising pages of the RAILWAY MAINTENANCE ENGINEER.

THE subject of resawing old bridge timbers and converting them into usable lumber is a live one, because it fits so well into the whole general scheme of railway economy. And since an outfit designed to do that work can also be used for converting trees into boards, one does not need a diagram to appreciate the downward trend of the cost line.

To makers of portable saw mills and cut-off saws, the Railway Maintenance Engineer offers an unparalleled means of communication with those officers in the maintenance of way department who have to do with specifying and buying machinery of that kind. The rates are ridiculously low; and our Service Department will prepare all of the necessary copy for a nominal sum.

Write for a suggestion for a *real* campaign. The time is psychologically right.

Simmons - Boardman Publishing Co.

New York Woolworth Bldg | **Chicago** Transportation Bldg. | **Cleveland** Citizens Bldg. | **Washington** Home Life Bldg.

The Railway Maintenance Engineer has applied for Membership in the Audit Bureau of Circulations.